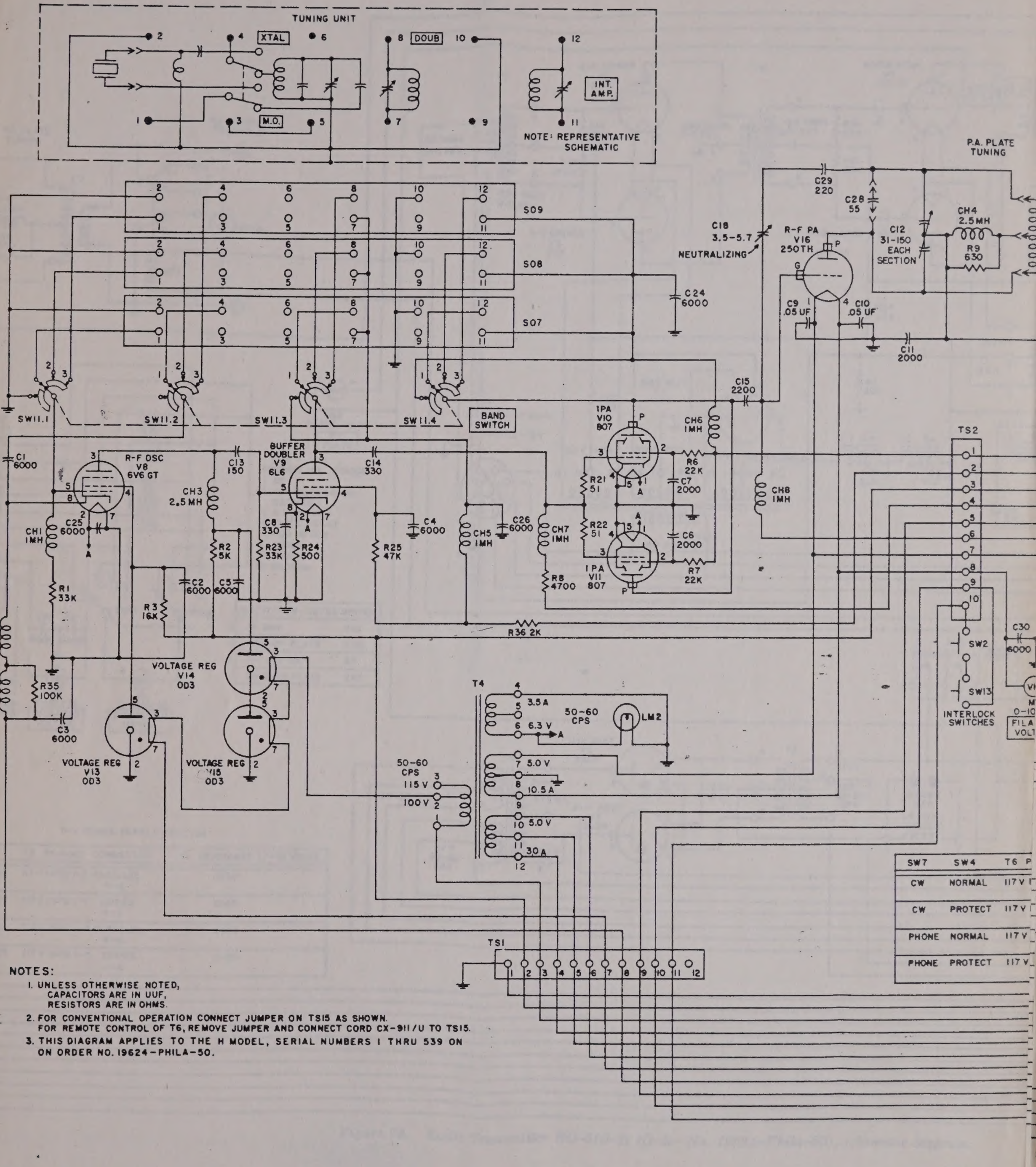
INSTRUCTION BOOK
FOR
RADIO TRANSMITTER BC-610-I

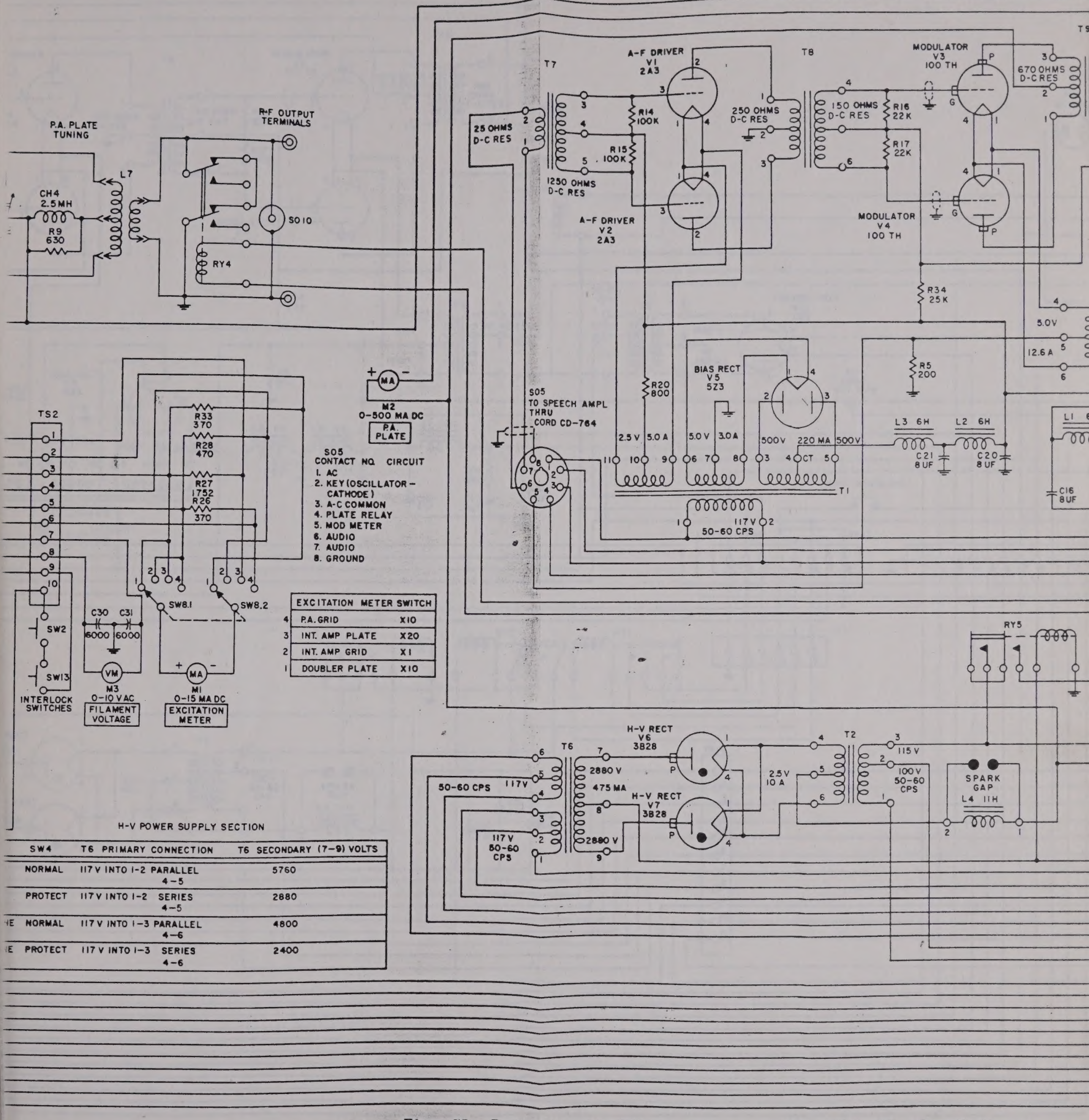
Pete
Joe
Sam

Manufactured by
the hallicrafters co.
Orders No. 1908-Phila-51-01-C, 3167-Phila-51 and 3201-Phila-51
15 October 1951


TUNING UNIT
XTAL
DOUB
M.O.
INT. AMP.
NOTE: REPRESENTATIVE SCHEMATIC
S09
S08
S07
C24 6000
SW11.1
SW11.2
SW11.3
SW11.4
BAND SWITCH
C1 6000
R-F OSC V8 6V6 GT
C13 150
BUFFER DOUBLER V9 6L6
C14 330
CH3 2.5 MH
C25 6000
CH1 1MH
C8 330
R2 5K
R23 33K
R24 500
R25 47K
C4 6000
CH5 1MH
C26 6000
CH7 1MH
R8 4700
R1 33K
R3 16K
C2 6000
C5 6000
R36 2K
CH2 1MH
CH9 10MH
R35 100K
C3 6000
VOLTAGE REG V13 OD3
VOLTAGE REG V14 OD3
VOLTAGE REG V15 OD3
1PA V10 807
1PA V11 807
R21 51
R22 51
R6 22K
R7 22K
C7 2000
C6 2000
CH6 1MH
CH8 1MH
C15 2200
C18 3.5-5.7
NEUTRALIZING
R-F PA V16 250TH
C29 220
C28 55
C12 31-150 EACH SECTION
CH4 2.5MH
R9 630
P.A. PLATE TUNING
C9 .05 UF
C10 .05 UF
C11 2000
TS2
SW2
SW13
INTERLOCK SWITCHES
C30 6000
FILA VOLT
0-10
T4
3.5A
6.3 V
5.0 V
10.5 A
5.0 V
30 A
50-60 CPS
LM2
50-60 CPS
115 V
100 V
TS1
SW7 SW4 T6 P
CW NORMAL 117 V
CW PROTECT 117 V
PHONE NORMAL 117 V
PHONE PROTECT 117 V

NOTES:

1. UNLESS OTHERWISE NOTED, CAPACITORS ARE IN UUF, RESISTORS ARE IN OHMS.
2. FOR CONVENTIONAL OPERATION CONNECT JUMPER ON TS15 AS SHOWN. FOR REMOTE CONTROL OF T6, REMOVE JUMPER AND CONNECT CORD CX-911/U TO TS15.
3. THIS DIAGRAM APPLIES TO THE H MODEL, SERIAL NUMBERS 1 THRU 539 ON ON ORDER NO. 19624-PHILA-50.


P.A. PLATE TUNING
R-F OUTPUT TERMINALS
L7
CH4
2.5 MH
R9
630
SO10
RY4
+ MA −
M2
0-500 MA DC
P.A. PLATE
T7
25 OHMS D-C RES
1250 OHMS D-C RES
R14 100K
R15 100K
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
250 OHMS D-C RES
T8
150 OHMS D-C RES
R16 22K
R17 22K
MODULATOR V3 100 TH
MODULATOR V4 100 TH
670 OHMS D-C RES
TS
R34 25K
5.0V
12.6 A
R5 200
R20 800
BIAS RECT V5 5Z3
2.5 V 5.0 A
5.0 V 3.0 A
500V 220 MA 500V
CT
T1
117V
50-60 CPS
L3 6H
L2 6H
C21 8 UF
C20 8 UF
L1
C16 8UF
S05 TO SPEECH AMPL THRU CORD CD-764
TS2
R33 370
R28 470
R27 1752
R26 370
SW8.1
SW8.2
C30 C31
6000 6000
SW2
SW13
INTERLOCK SWITCHES
VM
M3
0-10 VAC
FILAMENT VOLTAGE
+ MA −
M1
0-15 MA DC
EXCITATION METER
RY5
H-V RECT V6 3B28
H-V RECT V7 3B28
T6
50-60 CPS
117V
2880 V
475 MA
2880 V
117 V 50-60 CPS
T2
2.5V 10 A
115 V
100 V 50-60 CPS
SPARK GAP
L4 11H
H-V POWER SUPPLY SECTION

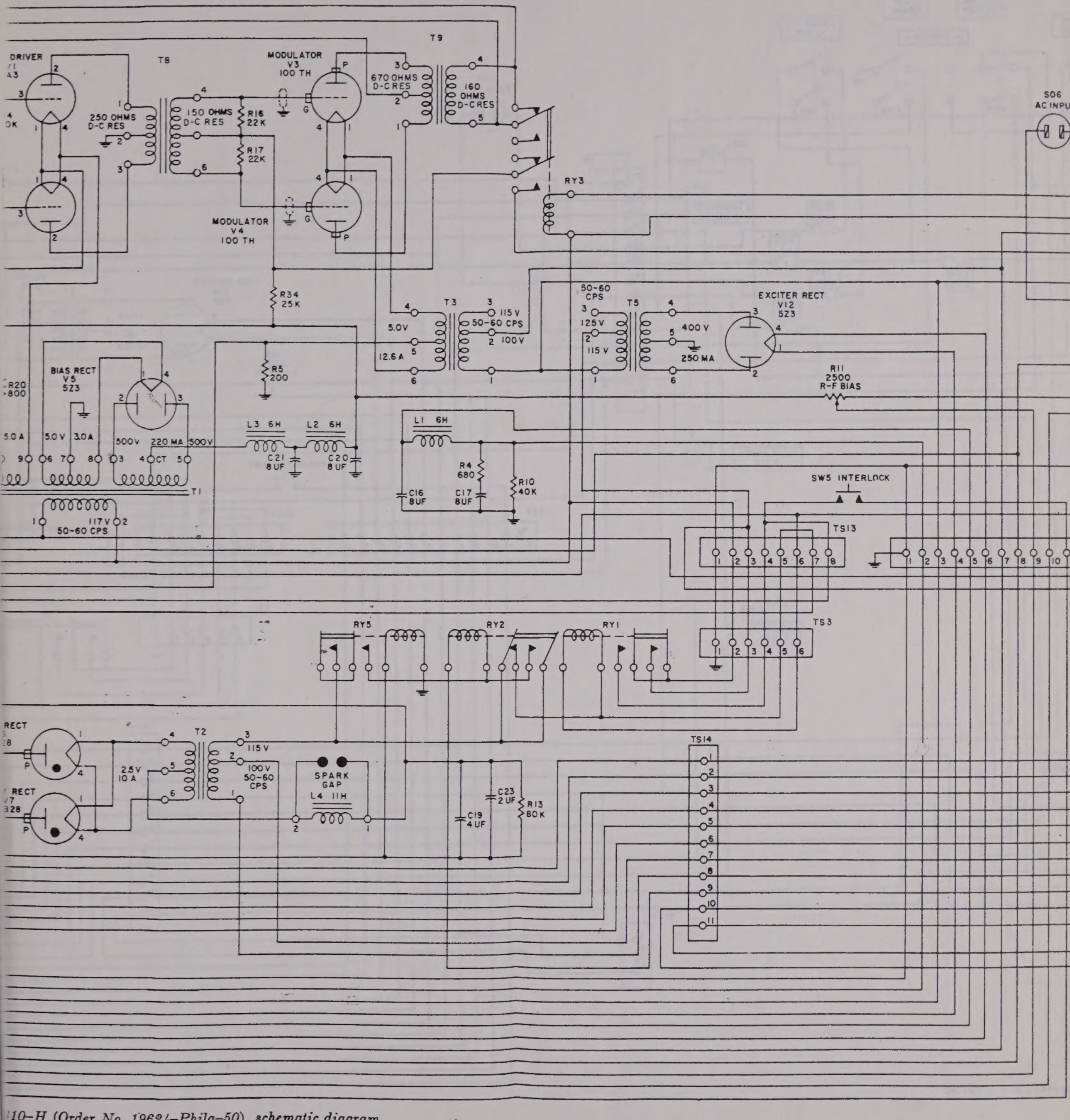
S05
CONTACT NO. CIRCUIT
1. AC
2. KEY (OSCILLATOR – CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD METER
6. AUDIO
7. AUDIO
8. GROUND

EXCITATION METER SWITCH		
4	P.A. GRID	X10
3	INT. AMP PLATE	X20
2	INT. AMP GRID	X1
1	DOUBLER PLATE	X10

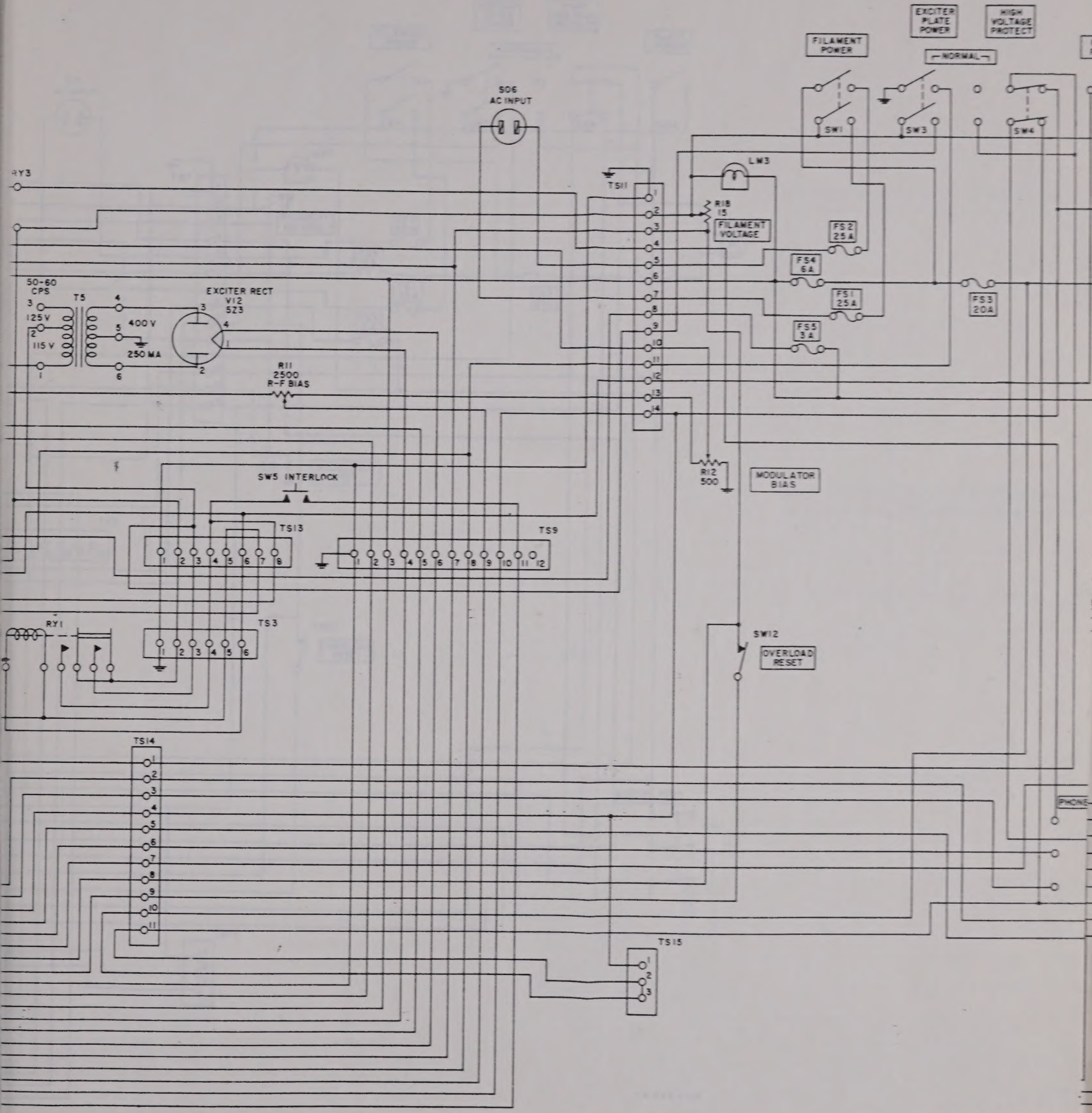
H-V POWER SUPPLY SECTION

	SW4	T6 PRIMARY CONNECTION	T6 SECONDARY (7–9) VOLTS
	NORMAL	117 V INTO 1-2 PARALLEL 4–5	5760
	PROTECT	117 V INTO 1-2 SERIES 4–5	2880
HE	NORMAL	117 V INTO 1–3 PARALLEL 4–6	4800
E	PROTECT	117 V INTO 1–3 SERIES 4–6	2400

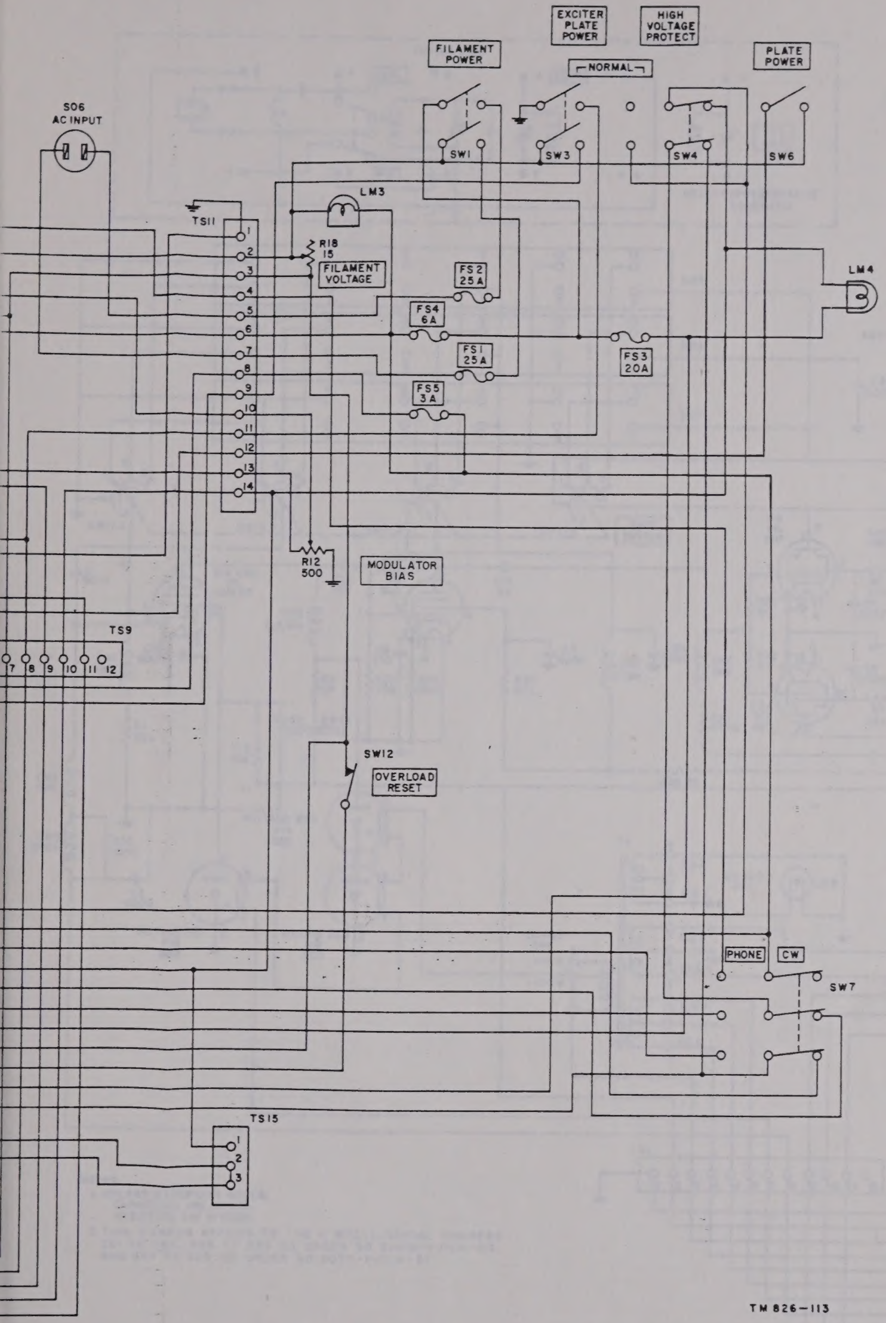
Figure 78. Radio Transmitter BC–610–H (Order No. 19624–Phila–50), schematic diagram.


DRIVER
T8
MODULATOR
V3
100 TH
T9
250 OHMS
D-C RES
150 OHMS
D-C RES
R16
22K
R17
22K
670 OHMS
D-C RES
160
OHMS
D-C RES
S06
AC INPUT
MODULATOR
V4
100 TH
RY3
R34
25K
T3
5.0V
12.6 A
115 V
50-60 CPS
100V
50-60
CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT
V12
5Z3
R5
200
R11
2500
R-F BIAS
BIAS RECT
V5
5Z3
R20
800
5.0 A
5.0 V
3.0A
500V
220 MA
500V
CT
L3 6H
L2 6H
C21
8 UF
C20
8 UF
L1 6H
R4
680
C16
8UF
C17
8UF
R10
40K
SW5 INTERLOCK
T1
117V
50-60 CPS
TS13
TS3
RY5
RY2
RY1
RECT
T2
115V
2.5V
10 A
100 V
50-60
CPS
SPARK
GAP
L4 11H
C23
2 UF
R13
80 K
C19
4 UF
RECT
TS14

10–H (Order No. 19624–Phila–50), schematic diagram.

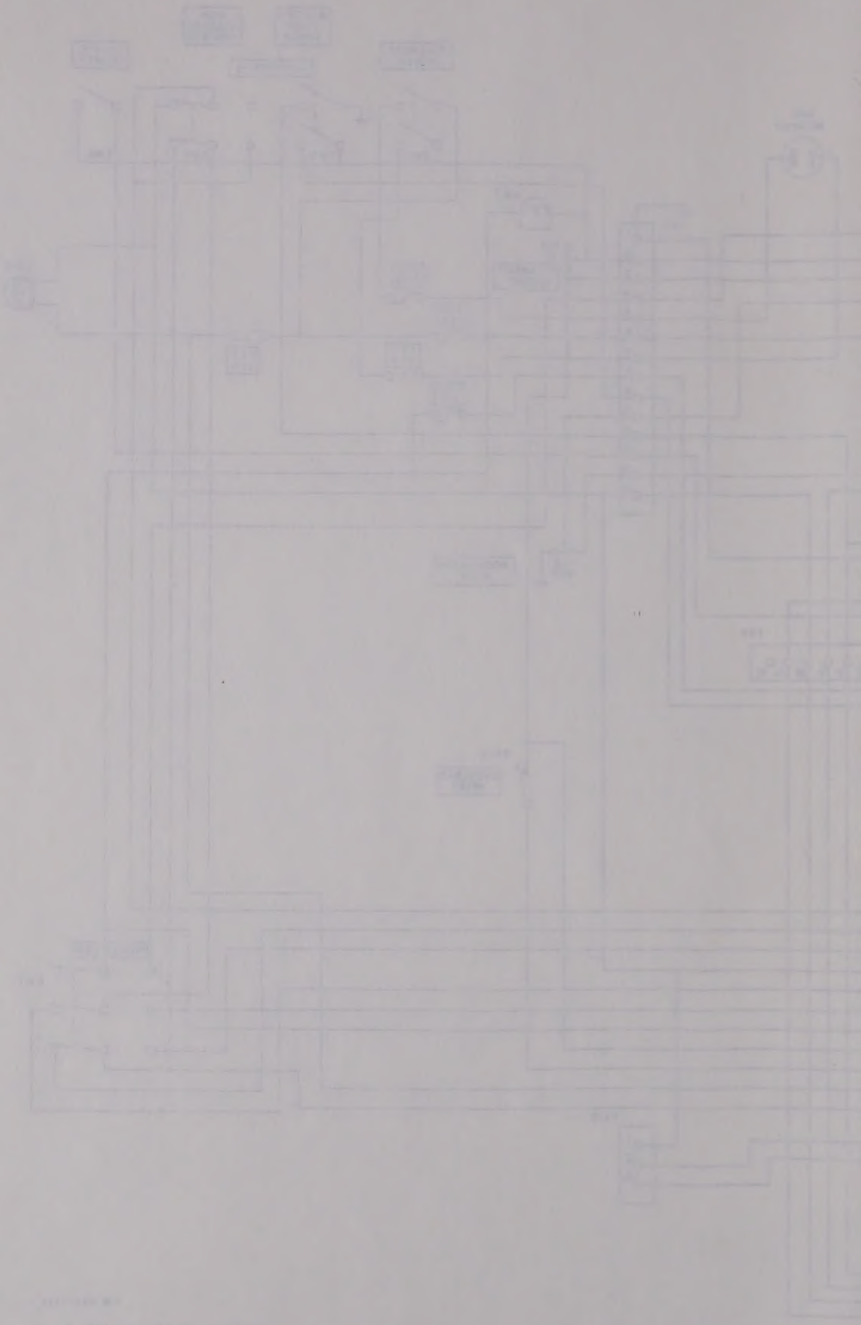

RY3
50-60 CPS
3
125 V
2
115 V
1
T5
4
5
400 V
250 MA
6
EXCITER RECT
V12
5Z3
3
4
1
2
SO6
AC INPUT
R11
2500
R-F BIAS
TS11
LM3
R18
15
FILAMENT VOLTAGE
R12
500
MODULATOR BIAS
FILAMENT POWER
EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
⌐NORMAL¬
SW1
SW3
SW4
FS2
25A
FS4
6A
FS1
25A
FS5
3A
FS3
20A
SW5 INTERLOCK
TS13
TS9
RY1
TS3
SW12
OVERLOAD RESET
TS14
TS15
PHONE

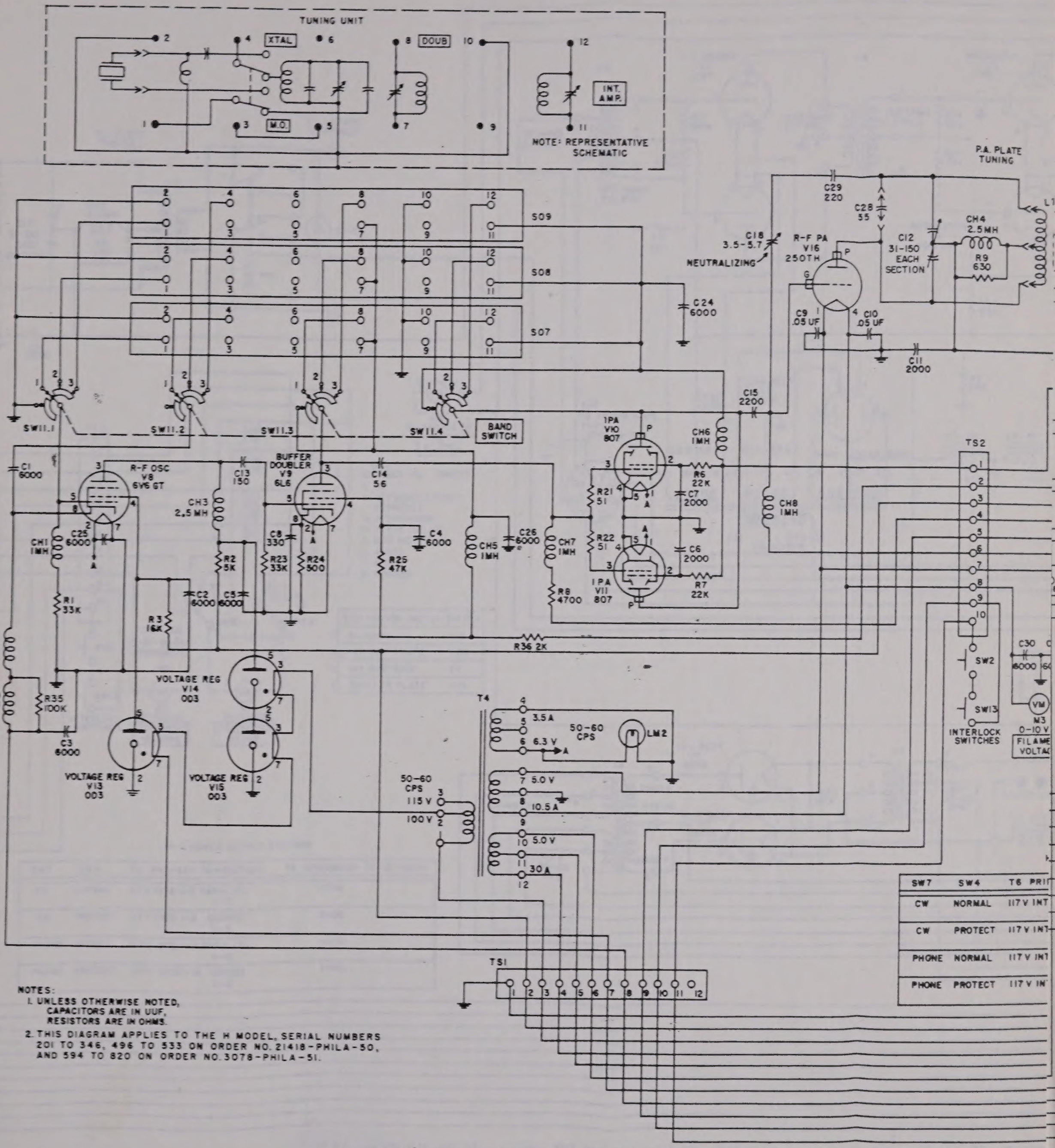
341205 O - 55 (Face p.


SO6
AC INPUT
TS11
1
2
3
4
5
6
7
8
9
10
11
12
13
14
LM3
R18
15
FILAMENT VOLTAGE
FILAMENT POWER
SW1
EXCITER PLATE POWER
SW3
NORMAL
HIGH VOLTAGE PROTECT
SW4
PLATE POWER
SW6
LM4
FS2
25A
FS4
6A
FS1
25A
FS3
20A
FS5
3A
R12
500
MODULATOR BIAS
TS9
7
8
9
10
11
12
SW12
OVERLOAD RESET
PHONE
CW
SW7
TS15
1
2
3

TM 826-113

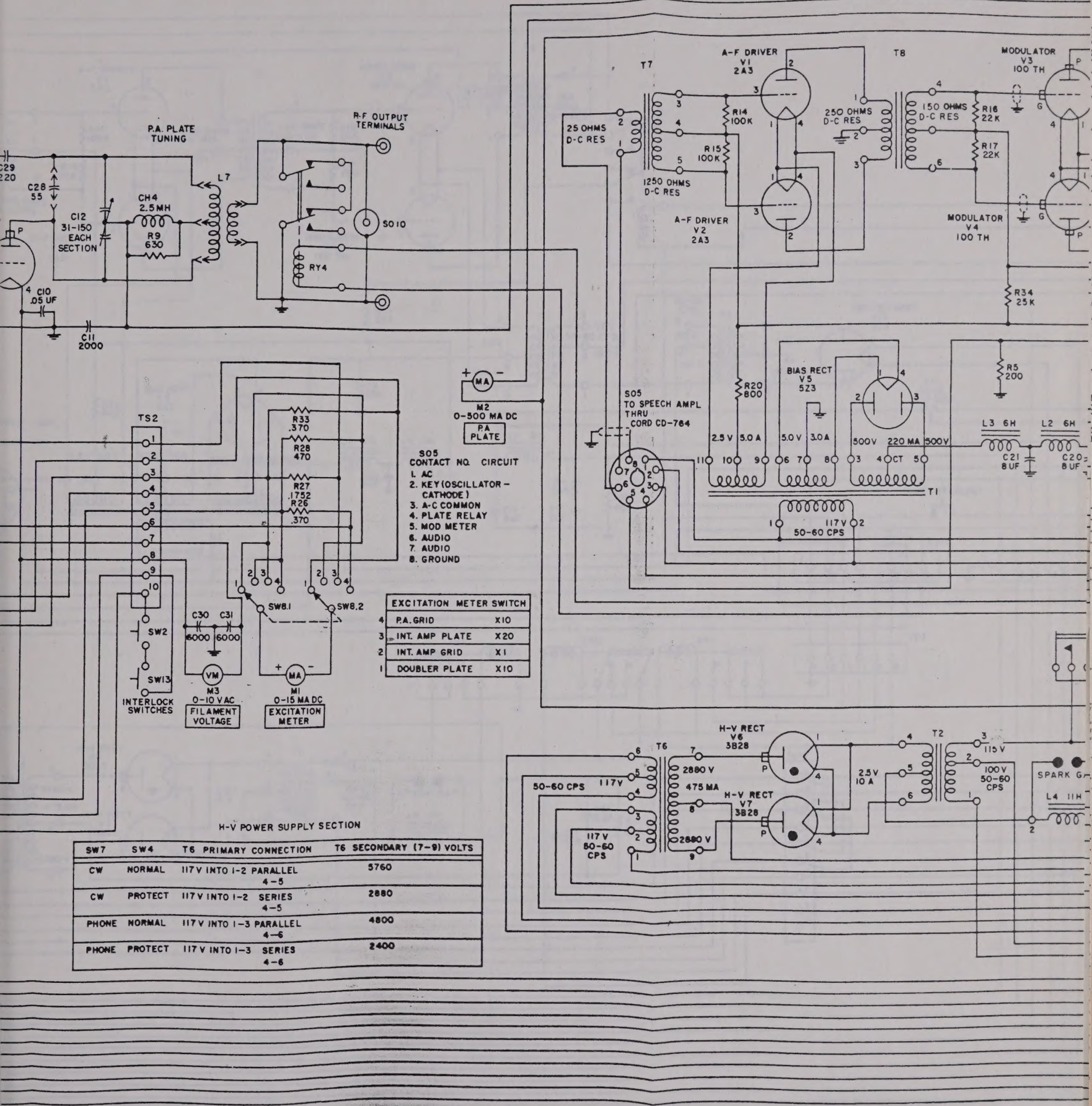
341205 O - 55 (Face p. 144) No. 3




TUNING UNIT
XTAL
DOUB
M.O.
INT. AMP.
NOTE: REPRESENTATIVE SCHEMATIC
S09
S08
S07
C24 6000
SW11.1
SW11.2
SW11.3
SW11.4
BAND SWITCH
C1 6000
R-F OSC V8 6V6 GT
C25 6000
CH1 1MH
R1 33K
CH2 1MH
CH9 10MH
R35 100K
C3 6000
VOLTAGE REG V13 003
C13 150
CH3 2,5 MH
R2 5K
R3 16K
C2 6000
C5 6000
VOLTAGE REG V14 003
VOLTAGE REG V15 003
BUFFER DOUBLER V9 6L6
C8 330
R23 33K
R24 500
C14 56
R25 47K
C4 6000
CH5 1MH
C26 6000
CH7 1MH
R8 4700
R36 2K
1PA V10 807
1PA V11 807
R21 51
R22 51
R6 22K
C7 2000
C6 2000
R7 22K
CH6 1MH
CH8 1MH
C15 2200
C18 3.5-5.7
NEUTRALIZING
R-F PA V16 250TH
C9 .05 UF
C10 .05 UF
C11 2000
C29 220
C28 55
C12 31-150 EACH SECTION
CH4 2.5MH
R9 630
P.A. PLATE TUNING
L1
TS2
SW2
SW13
INTERLOCK SWITCHES
C30 6000
M3 0-10 V
FILAME VOLTAG
T4
3.5 A
6.3 V
5.0 V
10.5 A
5.0 V
30 A
50-60 CPS
LM2
50-60 CPS
115 V
100 V
TS1

SW7	SW4	T6 PRI
CW	NORMAL	117 V INT
CW	PROTECT	117 V INT
PHONE	NORMAL	117 V INT
PHONE	PROTECT	117 V IN

NOTES:
1. UNLESS OTHERWISE NOTED, CAPACITORS ARE IN UUF, RESISTORS ARE IN OHMS.
2. THIS DIAGRAM APPLIES TO THE H MODEL, SERIAL NUMBERS 201 TO 346, 496 TO 533 ON ORDER NO. 21418-PHILA-50, AND 594 TO 820 ON ORDER NO. 3078-PHILA-51.


C29
220
C28
55
C12
31-150
EACH
SECTION
P.A. PLATE
TUNING
CH4
2.5 MH
R9
630
L7
C10
.05 UF
C11
2000
R-F OUTPUT
TERMINALS
SO10
RY4
T7
25 OHMS
D-C RES
1250 OHMS
D-C RES
R14
100K
R15
100K
A-F DRIVER
V1
2A3
A-F DRIVER
V2
2A3
T8
250 OHMS
D-C RES
150 OHMS
D-C RES
R16
22K
R17
22K
MODULATOR
V3
100 TH
MODULATOR
V4
100 TH
R34
25 K
R5
200
R20
800
BIAS RECT
V5
5Z3
2.5 V 5.0 A
5.0 V 3.0 A
500V 220 MA 500V
L3 6H
L2 6H
C21
8 UF
C20
8 UF
T1
117 V
50-60 CPS
M2
0-500 MA DC
P.A.
PLATE
SO5
TO SPEECH AMPL
THRU
CORD CD-764
TS2
R33
.370
R28
470
R27
.1752
R26
.370
SW8.1
SW8.2
C30
6000
C31
6000
SW2
SW13
INTERLOCK
SWITCHES
M3
0-10 VAC
FILAMENT
VOLTAGE
M1
0-15 MA DC
EXCITATION
METER
H-V RECT
V6
3B28
H-V RECT
V7
3B28
T6
50-60 CPS
117V
117 V
50-60
CPS
2880 V
475 MA
2880 V
2.5 V
10 A
T2
115 V
100 V
50-60
CPS
SPARK G
L4 11H
H-V POWER SUPPLY SECTION

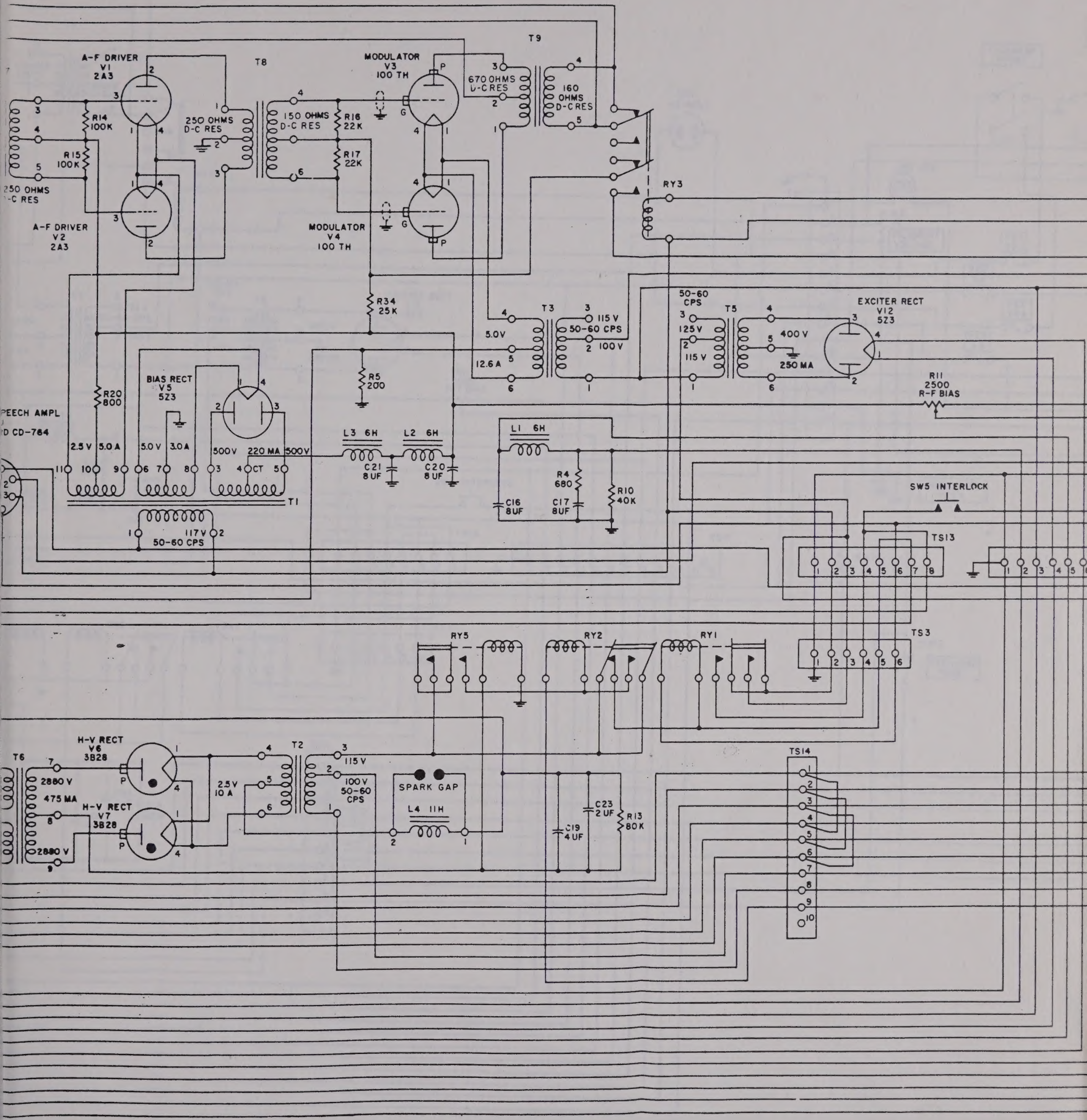
SO5
CONTACT NO. CIRCUIT
1. AC
2. KEY (OSCILLATOR – CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD METER
6. AUDIO
7. AUDIO
8. GROUND

	EXCITATION METER SWITCH	
4	P.A. GRID	X10
3	INT. AMP PLATE	X20
2	INT. AMP GRID	X1
1	DOUBLER PLATE	X10

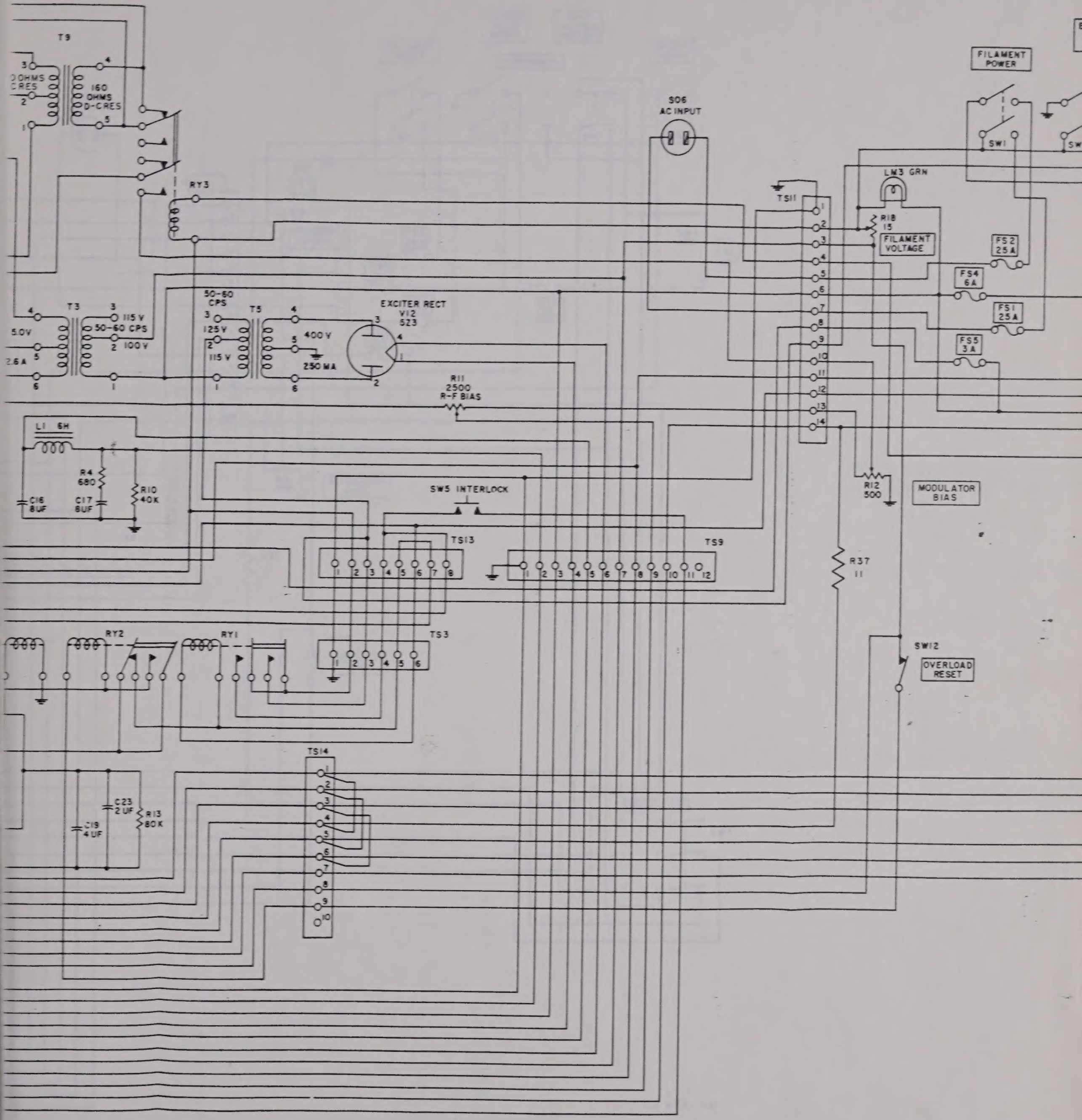
H-V POWER SUPPLY SECTION

SW7	SW4	T6 PRIMARY CONNECTION	T6 SECONDARY (7–9) VOLTS
CW	NORMAL	117V INTO 1-2 PARALLEL 4-5	5760
CW	PROTECT	117V INTO 1-2 SERIES 4-5	2880
PHONE	NORMAL	117V INTO 1-3 PARALLEL 4-6	4800
PHONE	PROTECT	117V INTO 1-3 SERIES 4-6	2400

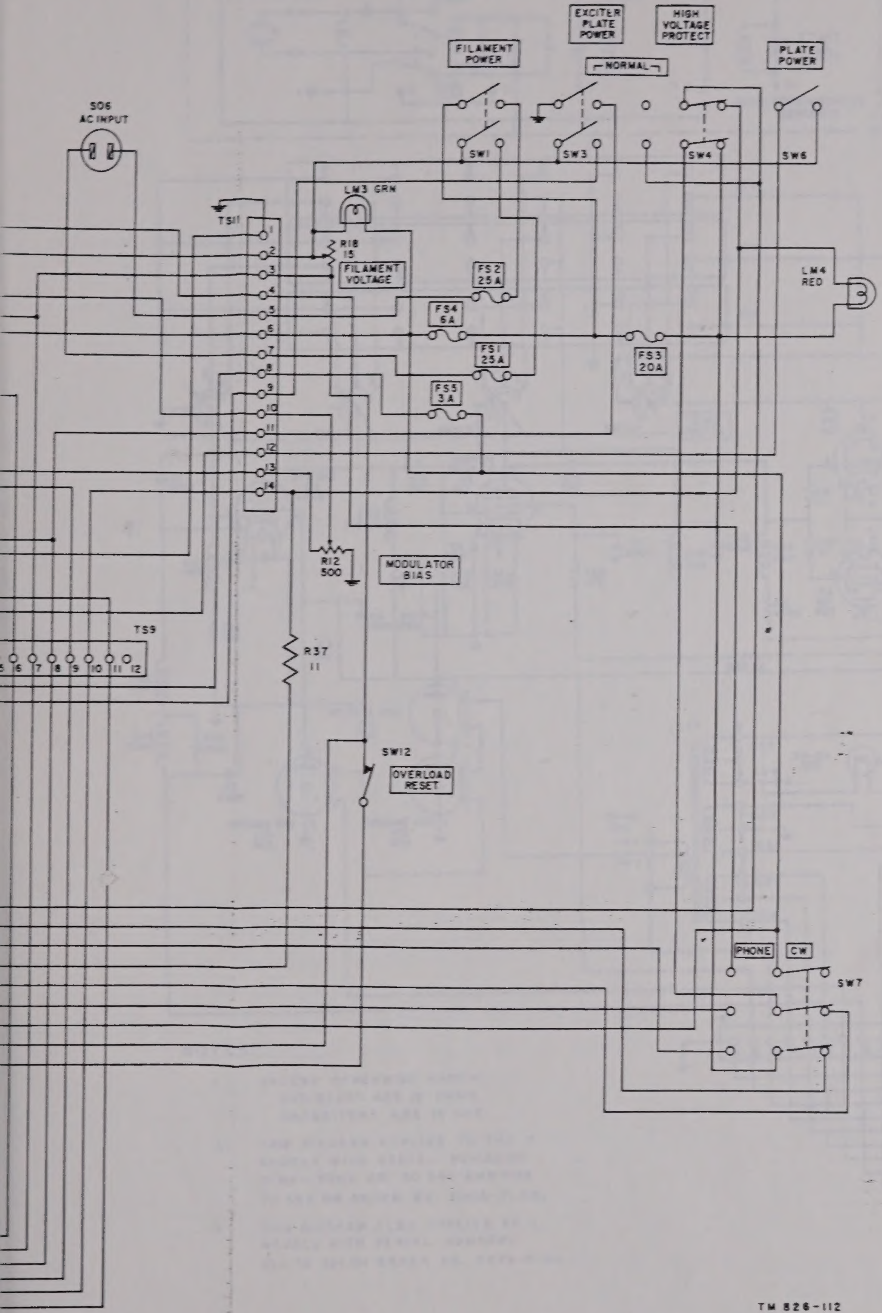
Figure 79. *Radio Transmitter BC–610–H (serial Nos. 201 to 346 and 496 to 533 on Order No. 21418·*
diagram.

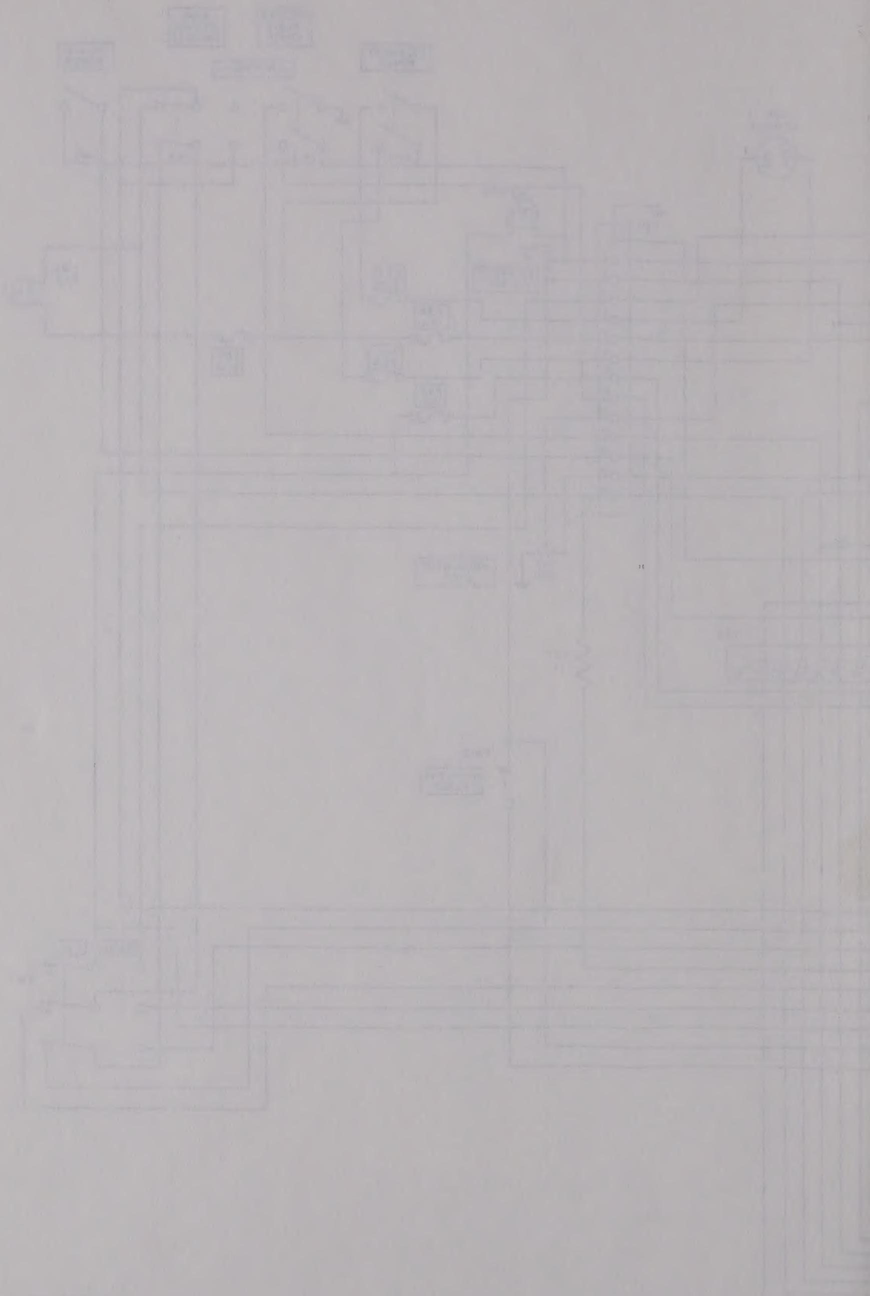

A-F DRIVER
V1
2A3
T8
MODULATOR
V3
100 TH
T9
670 OHMS
D-C RES
160
OHMS
D-C RES
250 OHMS
D-C RES
150 OHMS
D-C RES
R14
100K
R15
100K
R16
22K
R17
22K
250 OHMS
D-C RES
A-F DRIVER
V2
2A3
MODULATOR
V4
100 TH
RY3
R34
25K
R5
200
R20
800
BIAS RECT
V5
5Z3
SPEECH AMPL
D CD-764
2.5 V
5.0 A
5.0 V
3.0 A
500V
220 MA
500V
CT
T1
117 V
50-60 CPS
L3 6H
L2 6H
C21
8 UF
C20
8 UF
T3
5.0V
12.6 A
115 V
50-60 CPS
100 V
50-60
CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT
V12
5Z3
R11
2500
R-F BIAS
L1 6H
R4
680
C16
8UF
C17
8UF
R10
40K
SW5 INTERLOCK
TS13
TS3
RY5
RY2
RY1
H-V RECT
V6
3B28
T6
2880 V
475 MA
H-V RECT
V7
3B28
2880 V
T2
2.5 V
10 A
115 V
100 V
50-60
CPS
SPARK GAP
L4 11H
C19
4 UF
C23
2 UF
R13
80K
TS14
G
P

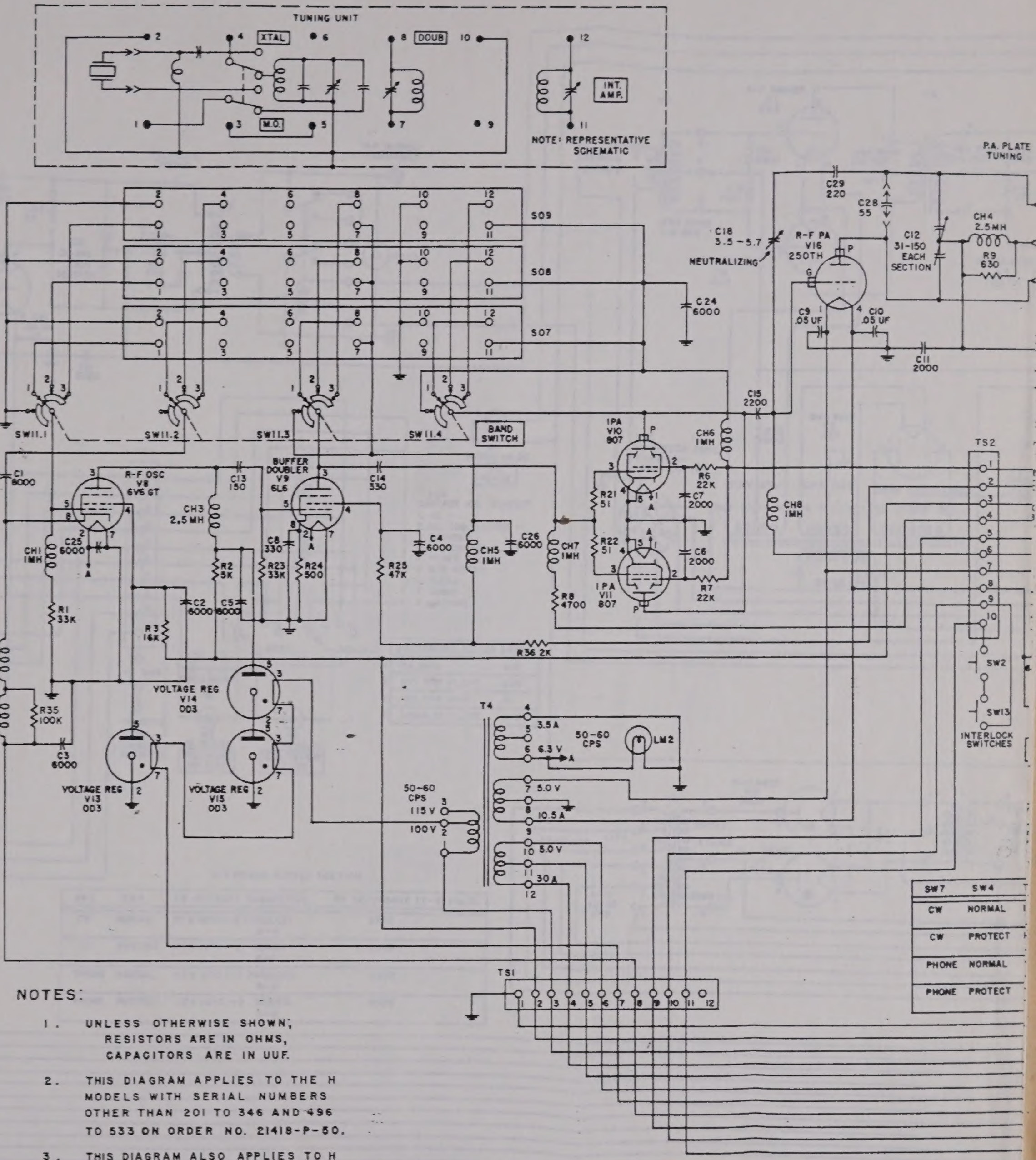
-H (serial Nos. 201 to 346 and 496 to 533 on Order No. 21418–Phila–50), schematic diagram.


T9
OHMS
CRES
160
OHMS
D-CRES
RY3
S06
AC INPUT
FILAMENT
POWER
SW1
LM3 GRN
TS11
R18
15
FILAMENT
VOLTAGE
FS2
25 A
FS4
6A
FS1
25 A
FS5
3 A
T3
5.0V
2.6 A
115 V
50-60 CPS
100 V
50-60
CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT
V12
5Z3
R11
2500
R-F BIAS
L1 6H
R4
680
C16
8UF
C17
8UF
R10
40K
SW5 INTERLOCK
TS13
TS9
R12
500
MODULATOR
BIAS
R37
11
RY2
RY1
TS3
SW12
OVERLOAD
RESET
TS14
C23
2 UF
R13
80K
C19
4 UF

-50), schematic

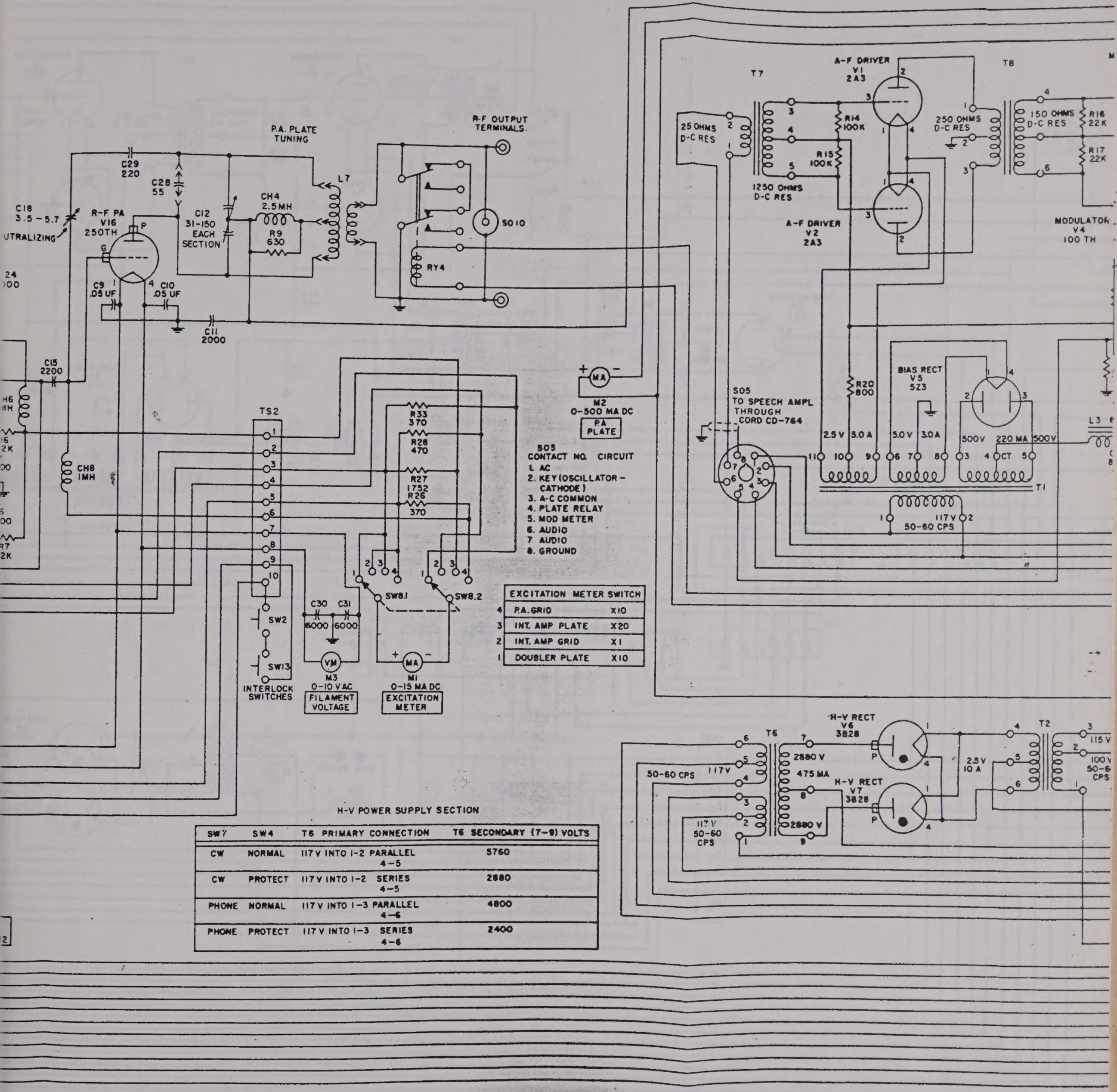

EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
FILAMENT POWER
PLATE POWER
NORMAL
SW1
SW3
SW4
SW6
SO6
AC INPUT
LM3 GRN
TS11
R18
15
FILAMENT VOLTAGE
FS2
25 A
FS4
6A
FS1
25 A
FS5
3 A
FS3
20A
LM4
RED
1
2
3
4
5
6
7
8
9
10
11
12
13
14
R12
500
MODULATOR BIAS
TS9
5
6
7
8
9
10
11
12
R37
11
SW12
OVERLOAD RESET
PHONE
CW
SW7




TUNING UNIT
XTAL
DOUB
M.O.
INT. AMP.
NOTE: REPRESENTATIVE SCHEMATIC
S09
S08
S07
SW11.1
SW11.2
SW11.3
SW11.4
BAND SWITCH
C24 6000
C18 3.5 – 5.7
NEUTRALIZING
R-F PA V16 250TH
C29 220
C28 55
C12 31-150 EACH SECTION
P.A. PLATE TUNING
CH4 2.5MH
R9 630
C9 .05 UF
C10 .05 UF
C11 2000
C15 2200
IPA V10 807
IPA V11 807
CH6 1MH
CH8 1MH
R6 22K
R7 22K
C7 2000
C6 2000
R21 51
R22 51
CH7 1MH
R8 4700
C1 6000
R-F OSC V8 6V6 GT
C25 6000
CH1 1MH
R1 33K
C13 150
BUFFER DOUBLER V9 6L6
C14 330
CH3 2.5MH
C8 330
R2 5K
R23 33K
R24 500
R25 47K
C4 6000
CH5 1MH
C26 6000
C2 6000
C5 6000
R3 16K
R36 2K
CH2 1MH
CH9 10MH
R35 100K
C3 6000
VOLTAGE REG V14 0D3
VOLTAGE REG V13 0D3
VOLTAGE REG V15 0D3
T4
3.5A
6.3 V
50–60 CPS
LM2
5.0 V
10.5 A
5.0V
30 A
115 V
100 V
TS2
SW2
SW13
INTERLOCK SWITCHES
TS1
SW7
SW4
CW
NORMAL
CW
PROTECT
PHONE
NORMAL
PHONE
PROTECT

NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. THIS DIAGRAM APPLIES TO THE H MODELS WITH SERIAL NUMBERS OTHER THAN 201 TO 346 AND 496 TO 533 ON ORDER NO. 21418-P-50.
3. THIS DIAGRAM ALSO APPLIES TO H MODELS WITH SERIAL NUMBERS 534 TO 821 ON ORDER NO. 3078-P-50.


P.A. PLATE TUNING
R-F OUTPUT TERMINALS.
C29 220
C28 55
C18 3.5 – 5.7
UTRALIZING
R-F PA V16 250TH
P
G
C12 31-150 EACH SECTION
CH4 2.5 MH
R9 630
L7
SO10
RY4
C9 .05 UF
C10 .05 UF
C11 2000
C15 2200
CH8 1MH
TS2
1
2
3
4
5
6
7
8
9
10
SW2
SW13
INTERLOCK SWITCHES
R33 370
R28 470
R27 1752
R26 370
SW8.1
SW8.2
C30 6000
C31 6000
VM
M3 0-10 VAC
FILAMENT VOLTAGE
MA
M1 0-15 MA DC
EXCITATION METER
MA
M2 0-500 MA DC
P.A. PLATE
T7
25 OHMS D-C RES
1250 OHMS D-C RES
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
R14 100K
R15 100K
R20 800
T8
250 OHMS D-C RES
150 OHMS D-C RES
R16 22K
R17 22K
MODULATOR V4 100 TH
SO5 TO SPEECH AMPL THROUGH CORD CD-764
BIAS RECT V5 5Z3
2.5 V 5.0 A
5.0 V 3.0 A
500V 220 MA 500V
CT
L3
T1
117 V 50-60 CPS
T6
117V
50-60 CPS
2880 V 475 MA
2880 V
117 V 50-60 CPS
H-V RECT V6 3B28
H-V RECT V7 3B28
2.5 V 10 A
T2
115 V
100 V 50-6 CPS

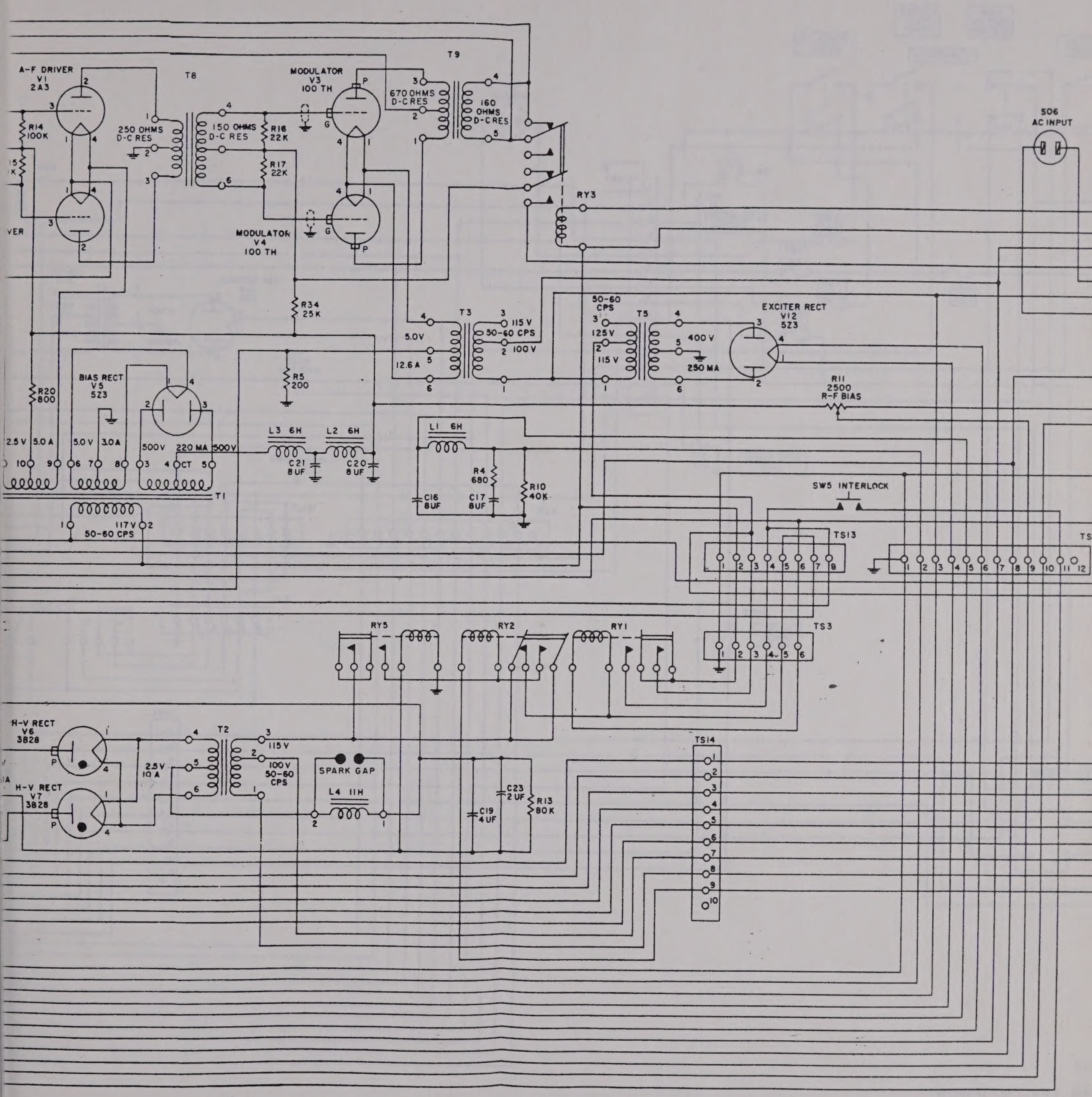
SO5
CONTACT NO. CIRCUIT
1. AC
2. KEY (OSCILLATOR – CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD METER
6. AUDIO
7 AUDIO
8. GROUND

	EXCITATION METER SWITCH	
4	P.A. GRID	X10
3	INT. AMP PLATE	X20
2	INT. AMP GRID	X1
1	DOUBLER PLATE	X10

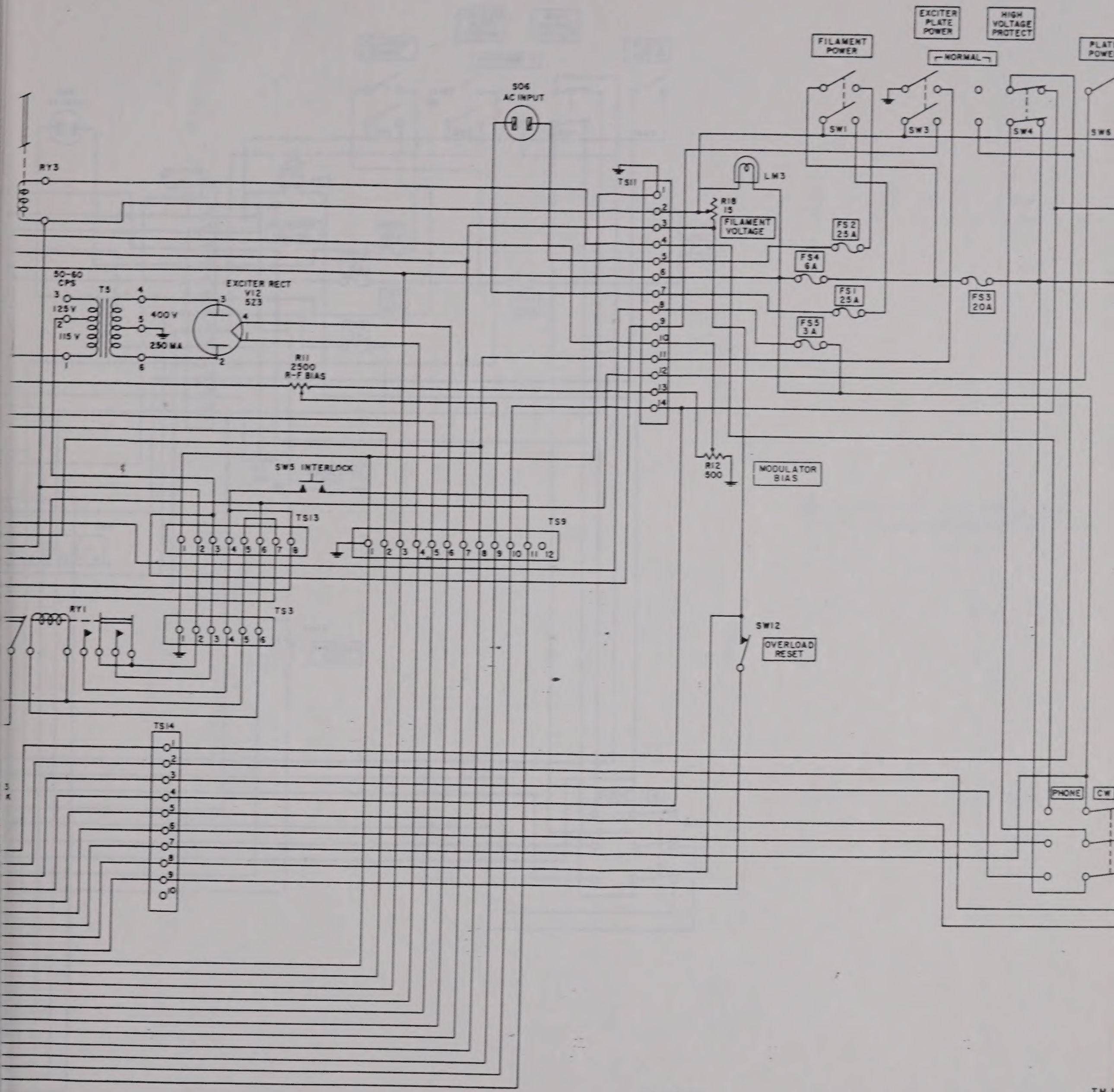
H-V POWER SUPPLY SECTION

SW7	SW4	T6 PRIMARY CONNECTION	T6 SECONDARY (7–9) VOLTS
CW	NORMAL	117 V INTO 1-2 PARALLEL 4–5	5760
CW	PROTECT	117 V INTO 1-2 SERIES 4–5	2880
PHONE	NORMAL	117 V INTO 1–3 PARALLEL 4–6	4800
PHONE	PROTECT	117 V INTO 1–3 SERIES 4–6	2400

Figure 80.* *Radio Transmitter BC–610–H (serial Nos. other than 201 to 346 and 496 to 5 ***and serial Nos. 534 to 821 on Order No. 3078–Phila–51), schemati***


A-F DRIVER
V1
2A3
R14
100K
VER
T8
250 OHMS
D-C RES
150 OHMS
D-C RES
R16
22K
R17
22K
MODULATOR
V3
100 TH
MODULATOR
V4
100 TH
T9
670 OHMS
D-C RES
160
OHMS
D-C RES
RY3
506
AC INPUT
R34
25K
T3
5.0V
12.6A
115 V
50-60 CPS
100 V
50-60
CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT
V12
5Z3
R11
2500
R-F BIAS
BIAS RECT
V5
5Z3
R5
200
R20
800
2.5 V
5.0 A
5.0 V
3.0A
500V
220 MA
500V
CT
L3 6H
L2 6H
C21
8 UF
C20
8 UF
L1 6H
R4
680
C16
8UF
C17
8UF
R10
40K
T1
117 V
50-60 CPS
SW5 INTERLOCK
TS13
TS
RY5
RY2
RY1
TS3
H-V RECT
V6
3B28
H-V RECT
V7
3B28
T2
2.5 V
10 A
115 V
100 V
50-60
CPS
SPARK GAP
L4 11H
C19
4 UF
C23
2 UF
R13
80 K
TS14

Nos. other than 201 to 346 and 496 to 533 on Order No. 21418–Phila–50 on Order No. 3078–Phila–51), schematic diagram.


FILAMENT POWER
EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
PLATE POWER
NORMAL
SW1
SW3
SW4
SW5
SO6 AC INPUT
RY3
TS11
LM3
R18 15
FILAMENT VOLTAGE
FS2 25A
FS4 6A
FS1 25A
FS5 3A
FS3 20A
50-60 CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT V12 5Z3
R11 2500 R-F BIAS
R12 500
MODULATOR BIAS
SW5 INTERLOCK
TS13
TS9
RY1
TS3
SW12
OVERLOAD RESET
TS14
PHONE
CW
TM

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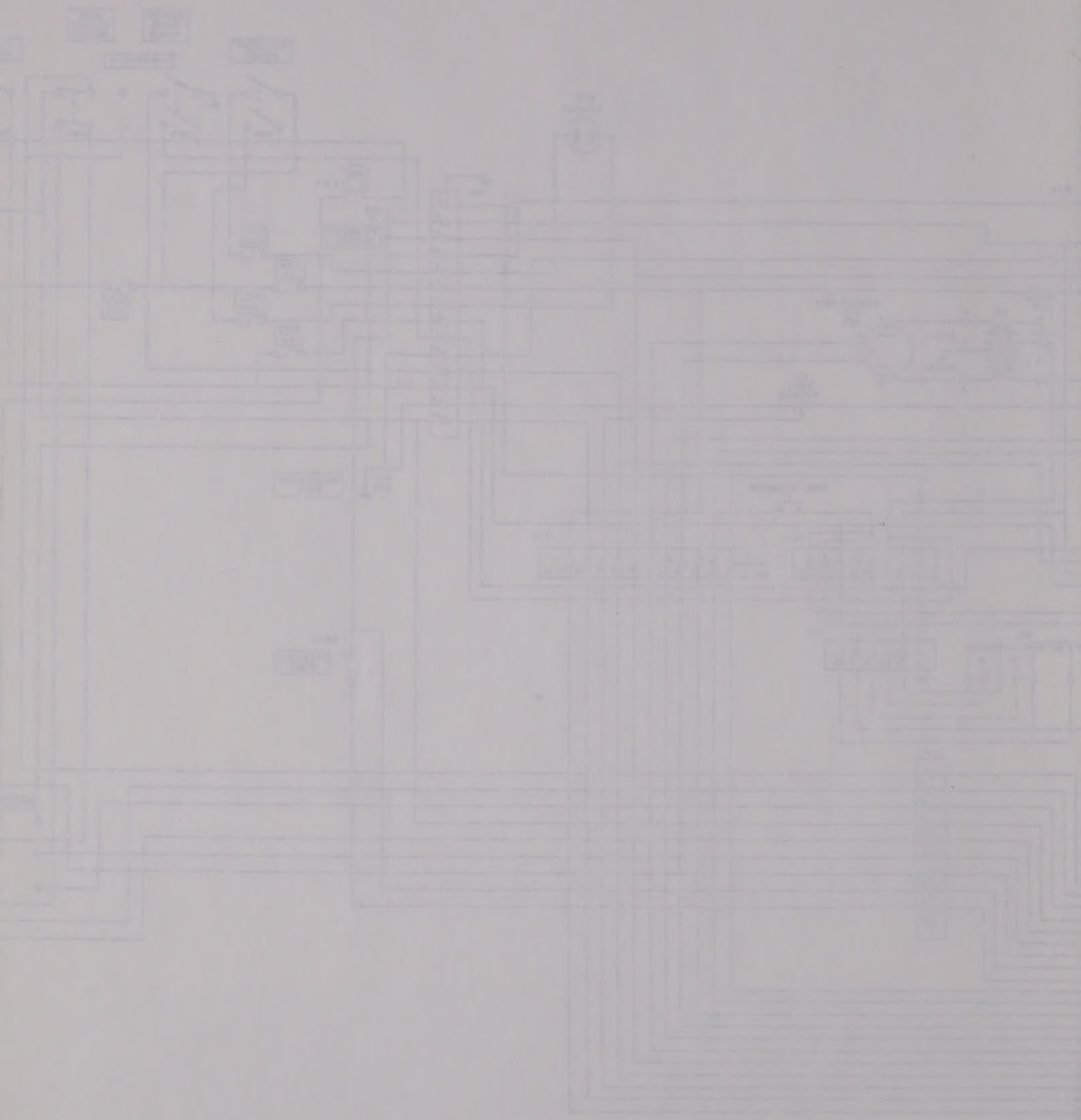
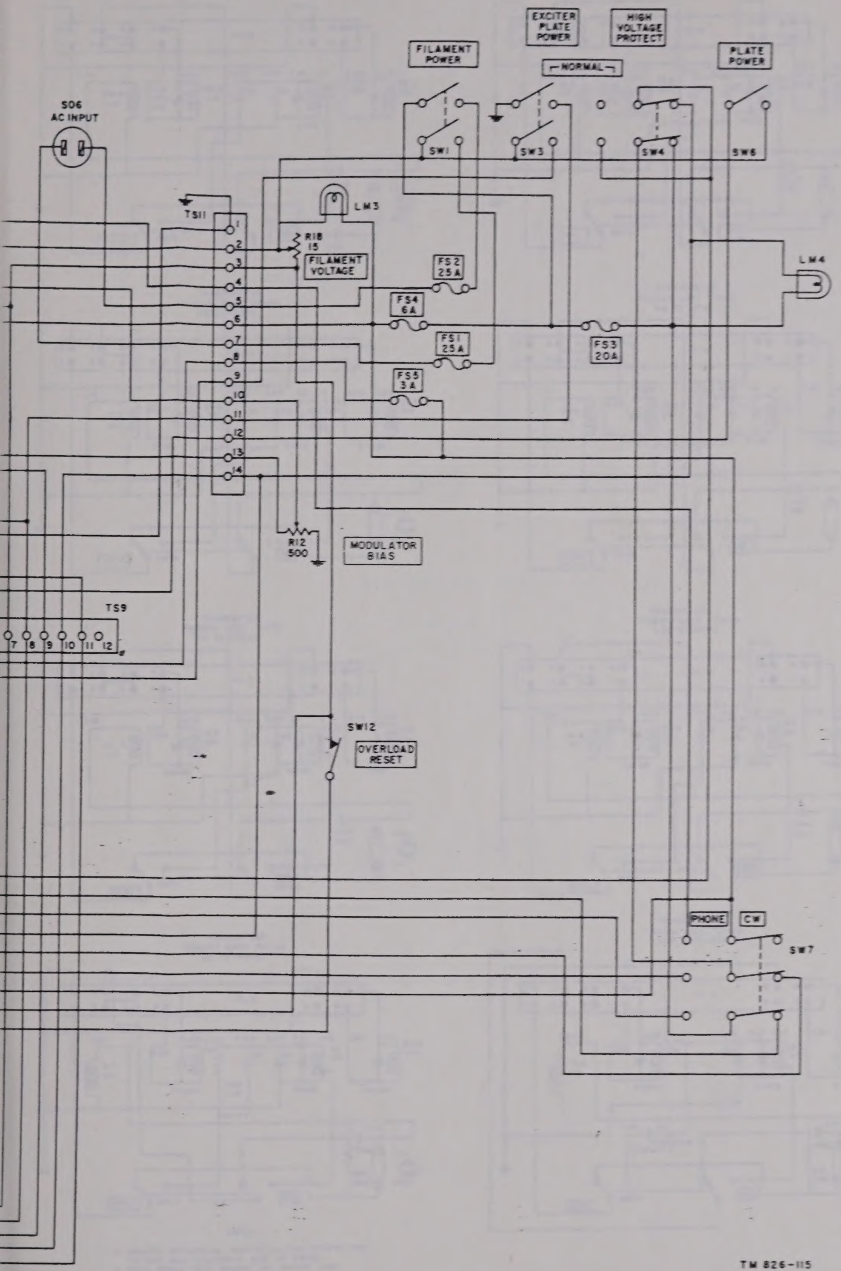
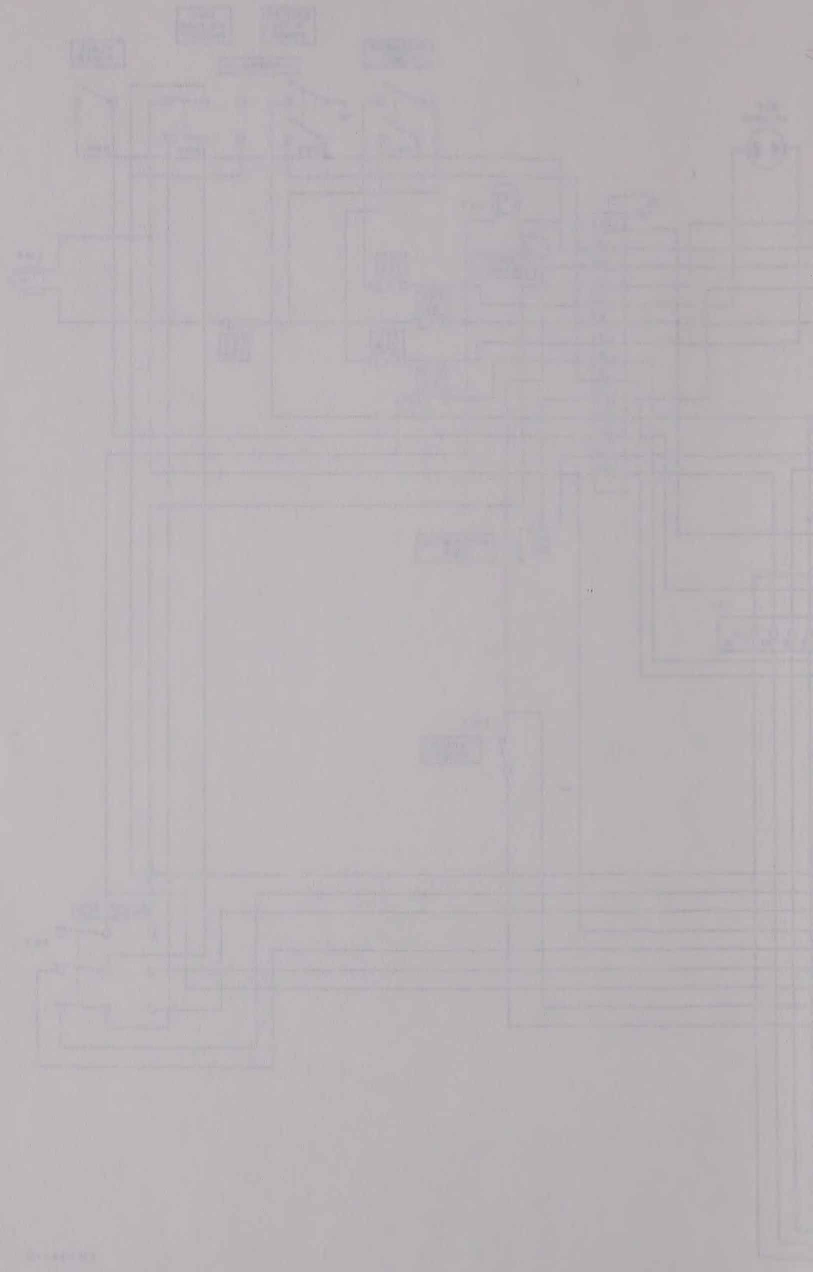
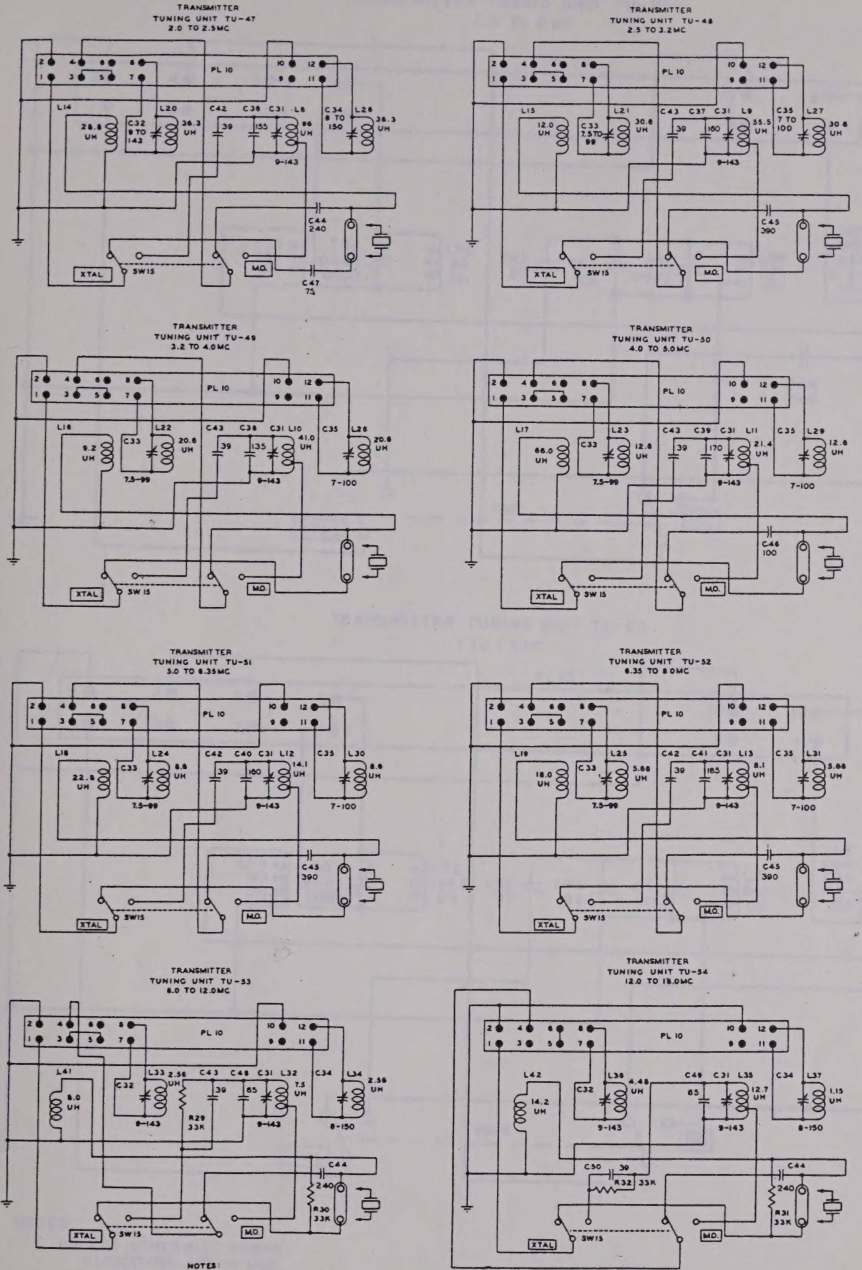



EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
FILAMENT POWER
NORMAL
PLATE POWER
SO6
AC INPUT
SW1
SW3
SW4
SW6
LM3
TS11
R18
15
FILAMENT VOLTAGE
FS2
25 A
FS4
6A
FS1
25 A
FS5
3 A
FS3
20A
LM4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
R12
500
MODULATOR BIAS
TS9
7
8
9
10
11
12
SW12
OVERLOAD RESET
PHONE
CW
SW7
TM 826-115



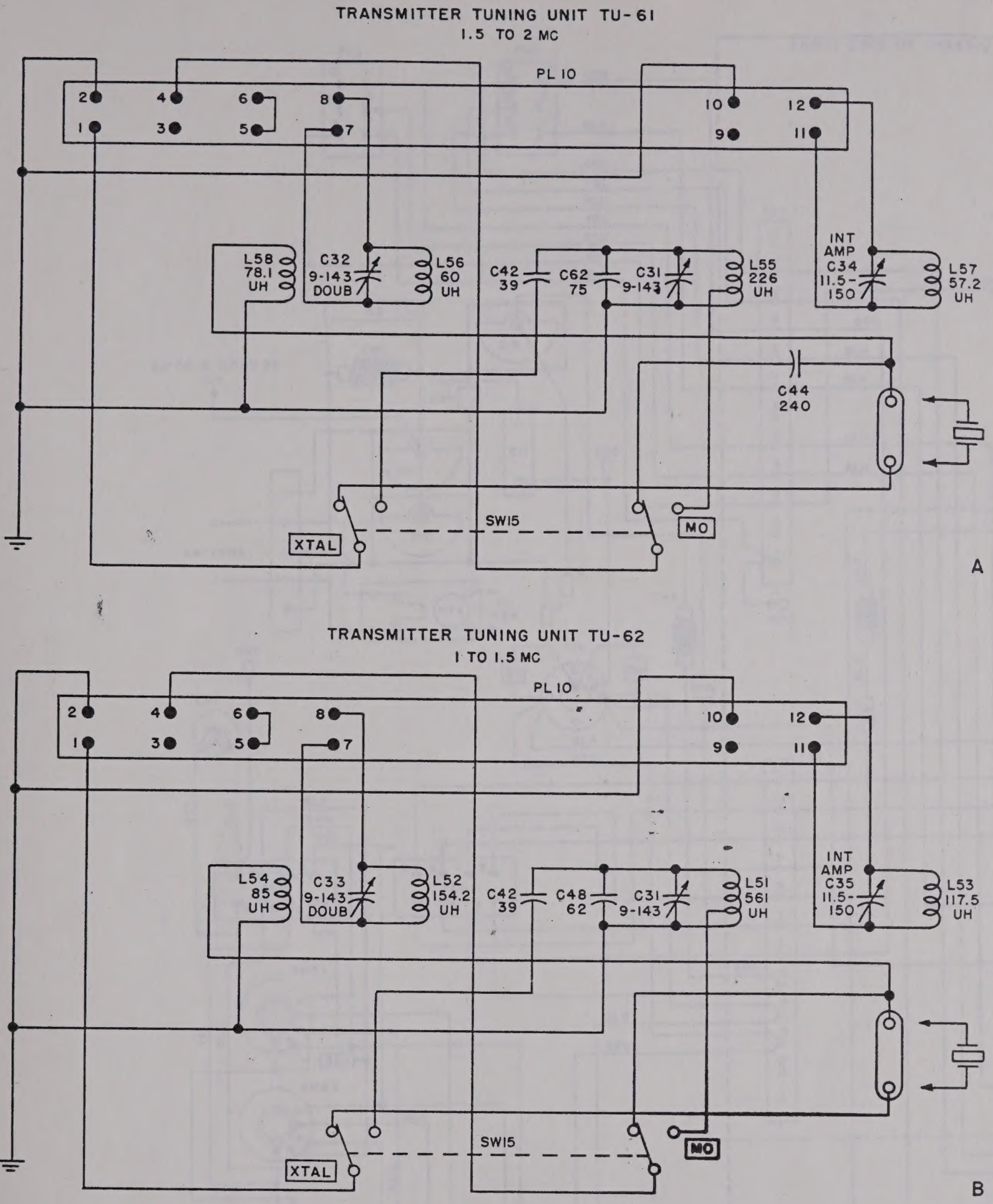

TRANSMITTER TUNING UNIT TU-47 2.0 TO 2.5MC
PL 10
L14 28.8 UH
L20 36.3 UH
C32 9 TO 143
C42 39
C38 155
C31 9-143
L8 86 UH
C34 8 TO 150
L26 36.3 UH
C44 240
C47 75
XTAL
SW15
M.O.
TRANSMITTER TUNING UNIT TU-48 2.5 TO 3.2MC
PL 10
L15 12.0 UH
C33 7.5 TO 99
L21 30.8 UH
C43 39
C37 160
C31 9-143
L9 55.5 UH
C35 7 TO 100
L27 30.8 UH
C45 390
XTAL
SW15
M.O.
TRANSMITTER TUNING UNIT TU-49 3.2 TO 4.0MC
PL 10
L16 9.2 UH
C33 7.5-99
L22 20.6 UH
C43 39
C38 135
C31 9-143
L10 41.0 UH
C35 7-100
L28 20.6 UH
XTAL
SW 15
M.O.
TRANSMITTER TUNING UNIT TU-50 4.0 TO 5.0MC
PL 10
L17 66.0 UH
C33 7.5-99
L23 12.8 UH
C43 39
C39 170
C31 9-143
L11 21.4 UH
C35 7-100
L29 12.8 UH
C46 100
XTAL
SW 15
M.O.
TRANSMITTER TUNING UNIT TU-51 5.0 TO 6.35MC
PL 10
L18 22.8 UH
C33 7.5-99
L24 8.8 UH
C42 39
C40 160
C31 9-143
L12 14.1 UH
C35 7-100
L30 8.8 UH
C45 390
XTAL
SW15
M.O.
TRANSMITTER TUNING UNIT TU-52 6.35 TO 8.0MC
PL 10
L19 18.0 UH
C33 7.5-99
L25 5.66 UH
C42 39
C41 165
C31 9-143
L13 8.1 UH
C35 7-100
L31 5.66 UH
C45 390
XTAL
SW15
M.O.
TRANSMITTER TUNING UNIT TU-53 8.0 TO 12.0MC
PL 10
L41 8.0 UH
C32 9-143
L33 2.56 UH
R29 33K
C43 39
C48 65
C31 9-143
L32 7.5 UH
C34 8-150
L34 2.56 UH
C44 240
R30 33K
XTAL
SW15
M.O.
TRANSMITTER TUNING UNIT TU-54 12.0 TO 18.0MC
PL 10
L42 14.2 UH
C32 9-143
L36 4.48 UH
C49 65
C31 9-143
L35 12.7 UH
C34 8-150
L37 1.15 UH
C50 39
R32 33K
C44 240
R31 33K
XTAL
SW15
M.O.

NOTES:

1. UNLESS OTHERWISE NOTED ALL CAPACITORS ARE IN UUF. ALL RESISTORS ARE IN OHMS.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

TM 826-43

Figure 82. Transmitter Tuning Units TU-47 through TU-54, schematic diagram.


TRANSMITTER TUNING UNIT TU-61
1.5 TO 2 MC
PL 10
2
1
4
3
6
5
8
7
10
9
12
11
L58
78.1
UH
C32
9-143
DOUB
L56
60
UH
C42
39
C62
75
C31
9-143
L55
226
UH
INT
AMP
C34
11.5-
150
L57
57.2
UH
C44
240
SW15
XTAL
MO
A
TRANSMITTER TUNING UNIT TU-62
1 TO 1.5 MC
PL 10
2
1
4
3
6
5
8
7
10
9
12
11
L54
85
UH
C33
9-143
DOUB
L52
154.2
UH
C42
39
C48
62
C31
9-143
L51
561
UH
INT
AMP
C35
11.5-
150
L53
117.5
UH
SW15
XTAL
MO
B

NOTES:
1. UNLESS OTHERWISE SHOWN, CAPACITORS ARE IN UUF.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

TM 826-114

Figure 83. Transmitter Tuning Units TU-61 and TU-62, schematic diagram.

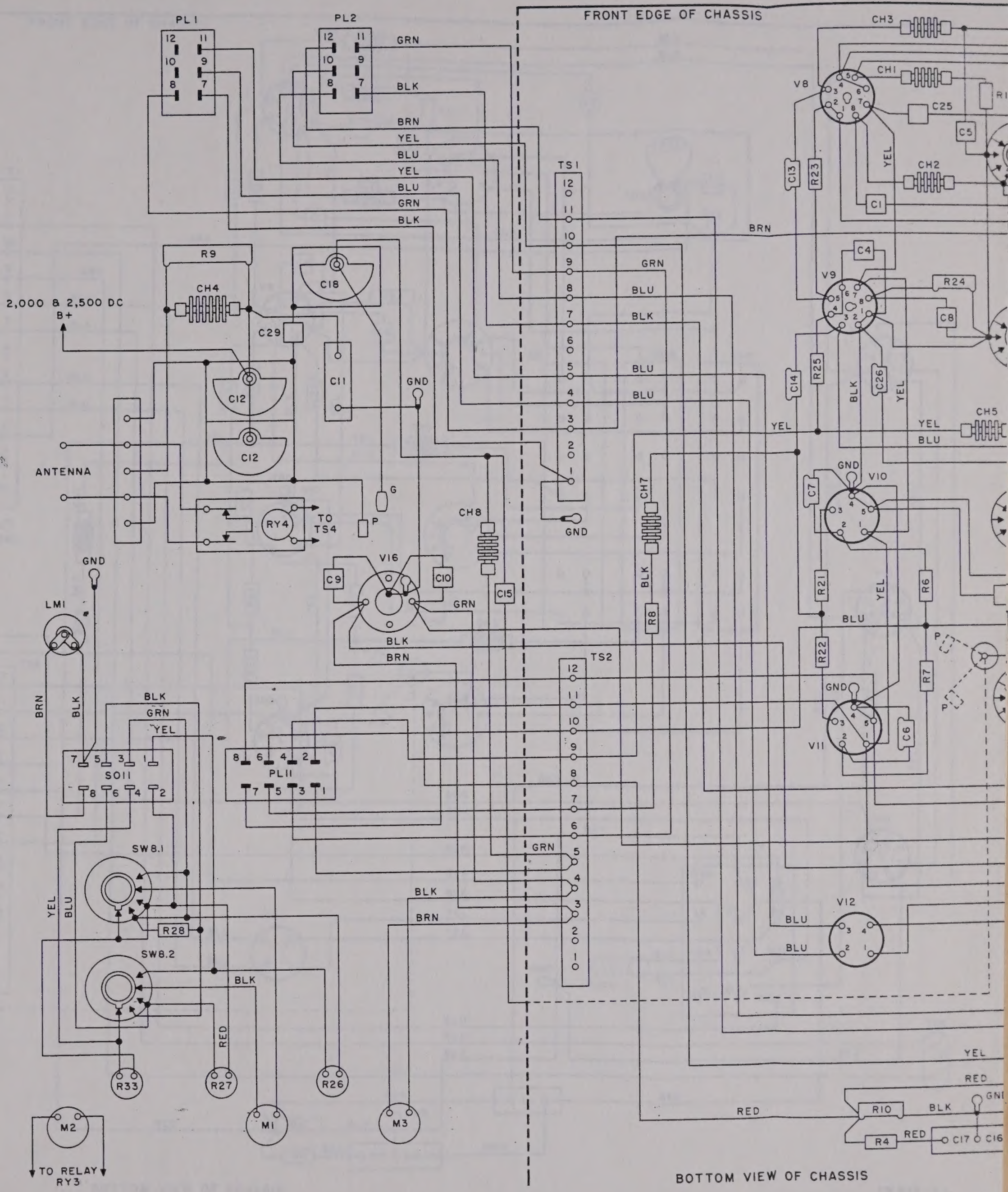
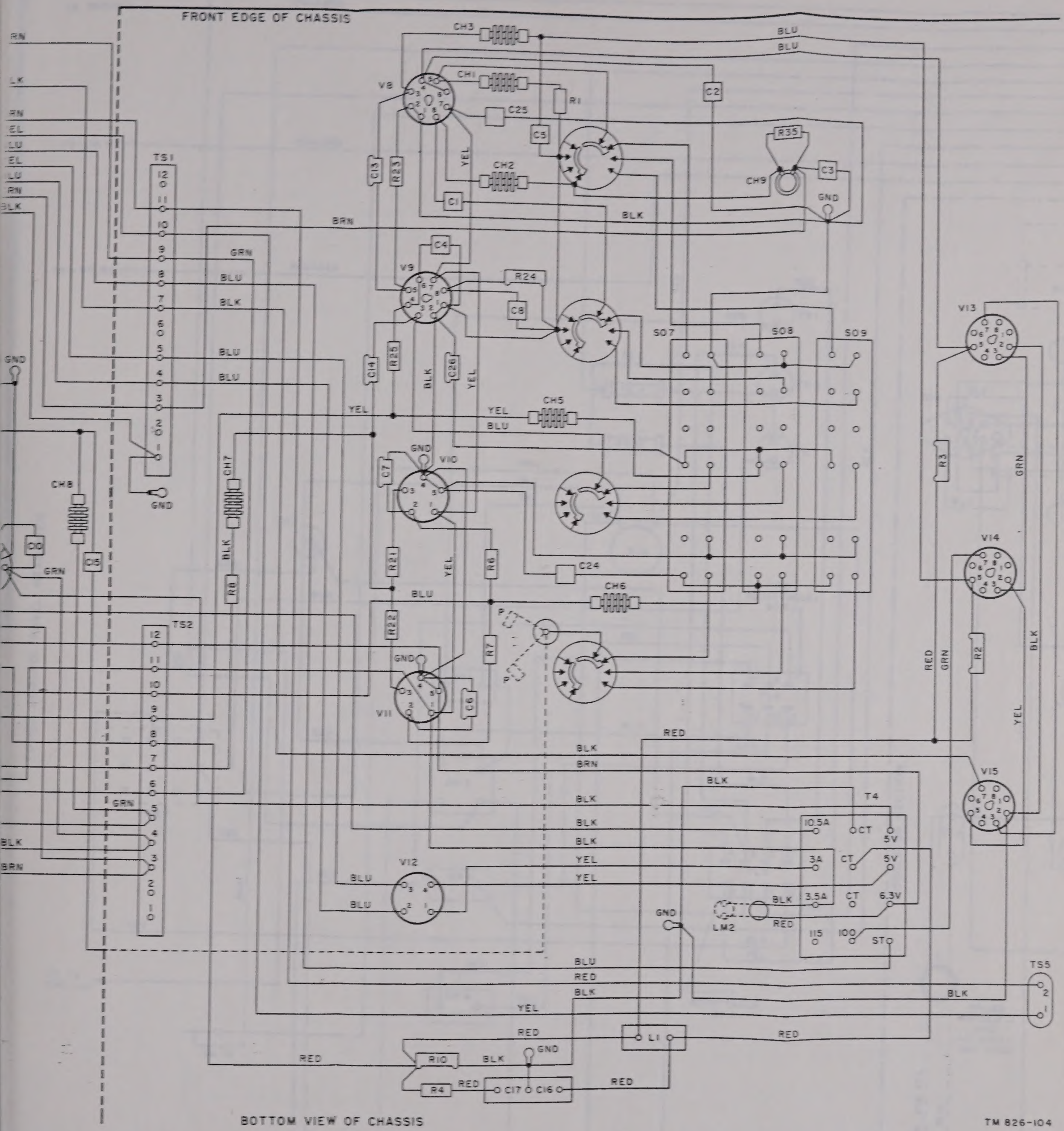

FRONT EDGE OF CHASSIS
PL1
PL2
12
11
10
9
8
7
GRN
BLK
BRN
YEL
BLU
YEL
BLU
GRN
BLK
TS1
R9
CH4
C18
C29
C11
C12
C12
2,000 & 2,500 DC B+
ANTENNA
GND
RY4
TO TS4
G
P
CH8
C15
V16
C9
C10
GRN
BLK
BRN
LM1
GND
BRN
BLK
BLK
GRN
YEL
SO11
PL11
TS2
SW8.1
SW8.2
R28
YEL
BLU
BLK
RED
BLK
BRN
R33
R27
R26
M1
M2
M3
TO RELAY RY3
CH3
V8
CH1
R1
C25
C5
C13
R23
YEL
CH2
C1
BRN
C4
V9
R24
C8
GRN
BLU
BLK
BLU
BLU
C14
R25
BLK
C26
YEL
YEL
YEL
CH5
BLU
GND
V10
C7
CH7
BLK
R8
R21
YEL
R6
BLU
R22
R7
P
P
GND
V11
C6
V12
BLU
BLU
YEL
RED
GND
RED
R10
BLK
R4
RED
C17
C16
BOTTOM VIEW OF CHASSIS

Figure 84. Radio Transmitter BC-610-E, exciter deck, practical wirin


FRONT EDGE OF CHASSIS
BOTTOM VIEW OF CHASSIS
TS1
TS2
TS5
V8
V9
V10
V11
V12
V13
V14
V15
CH1
CH2
CH3
CH5
CH6
CH7
CH8
CH9
C1
C2
C3
C4
C5
C6
C7
C8
C10
C13
C14
C15
C16
C17
C24
C25
C26
R1
R2
R3
R4
R6
R7
R8
R10
R21
R22
R23
R24
R25
R35
SO7
SO8
SO9
T4
10.5A
CT
5V
3A
3.5A
6.3V
115
100
ST
LM2
L1
P
GND
BLU
BLK
BRN
GRN
YEL
RED

TM 826-104

Figure 84. Radio Transmitter BC-610-E, exciter deck, practical wiring diagram.

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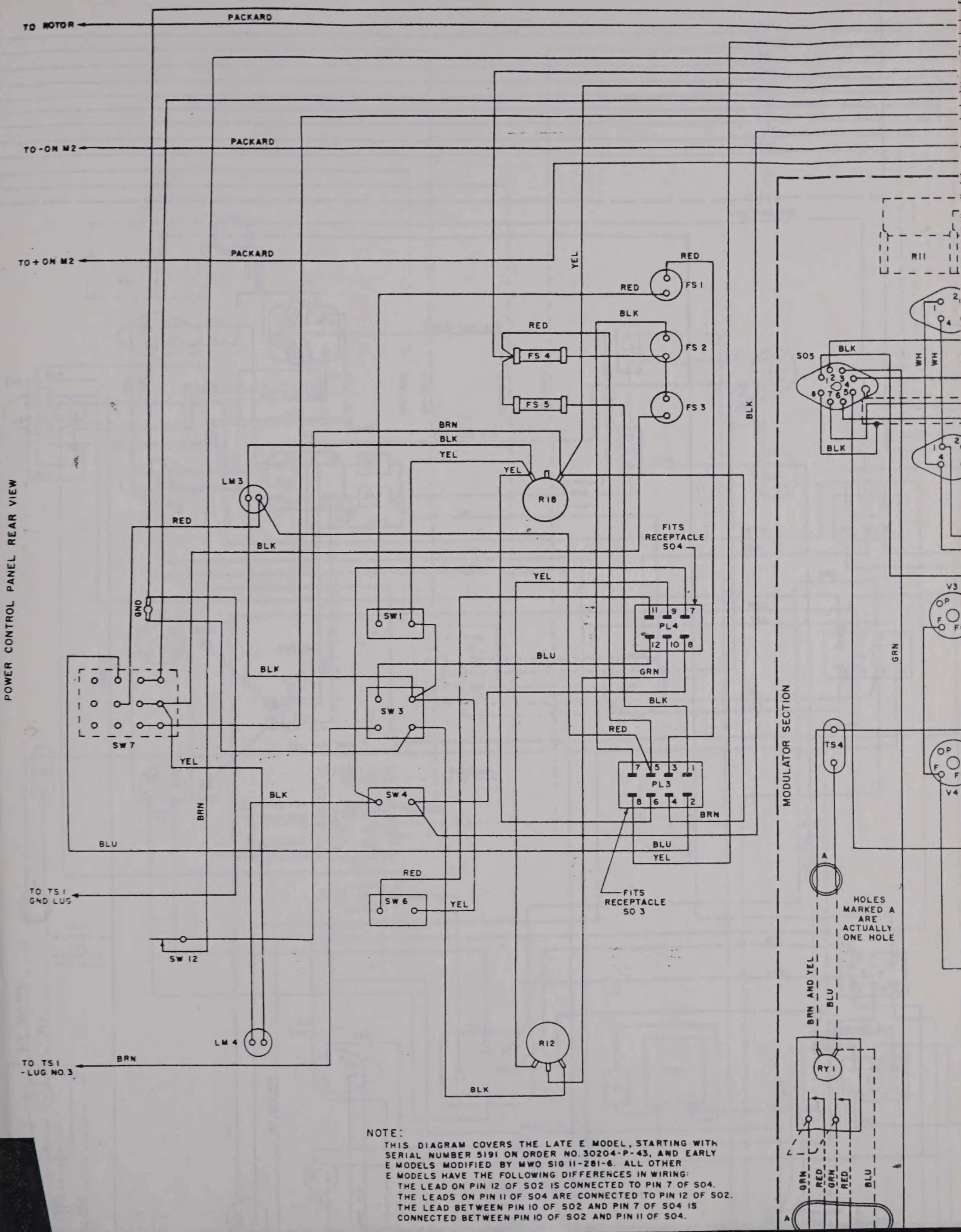
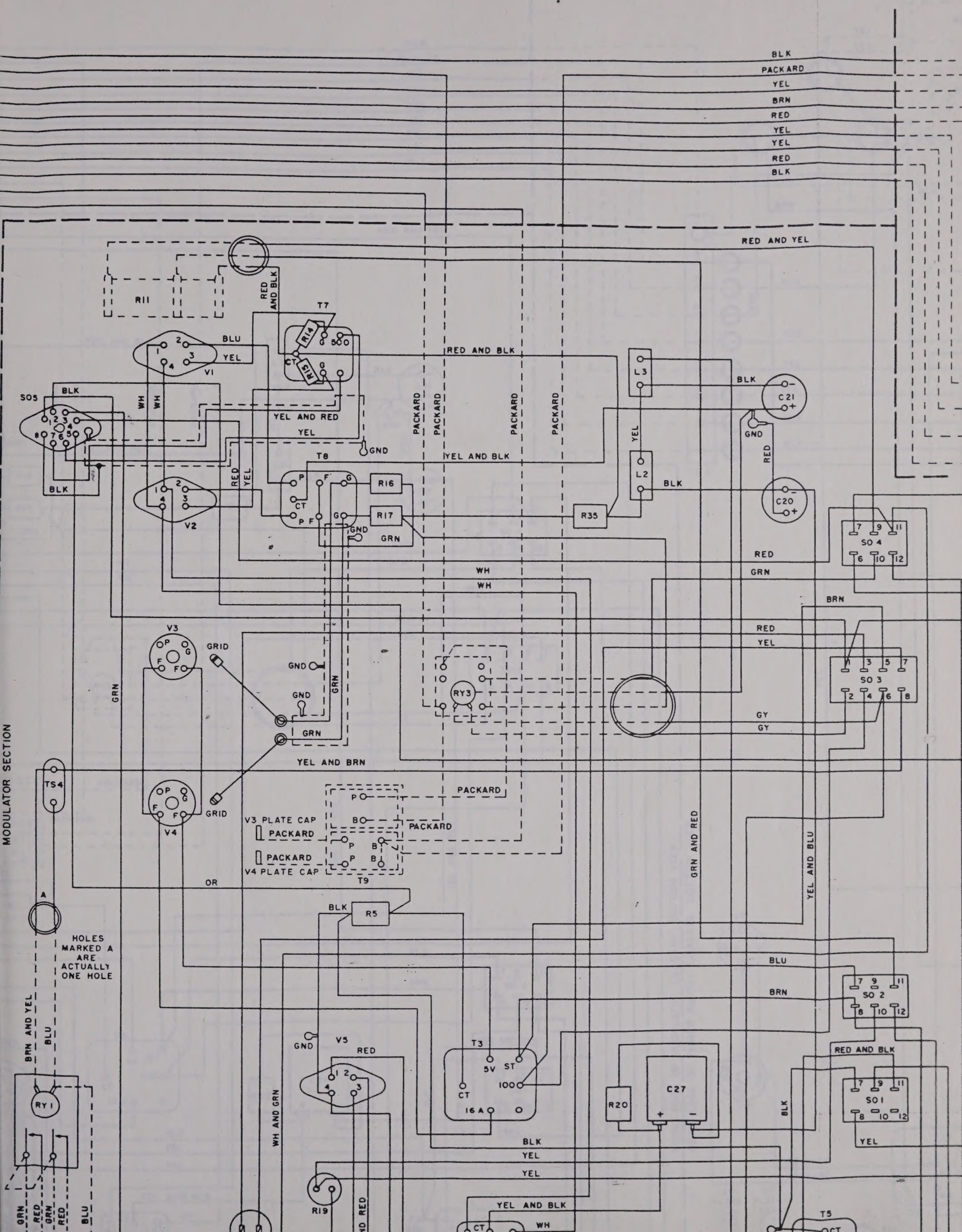

POWER CONTROL PANEL REAR VIEW
TO ROTOR
PACKARD
TO -ON M2
PACKARD
TO + ON M2
PACKARD
YEL
RED
RED
FS 1
BLK
RED
FS 2
FS 4
FS 5
FS 3
BLK
BRN
BLK
YEL
YEL
LM 3
R18
RED
BLK
FITS RECEPTACLE SO4
YEL
GND
SW 1
11 9 7
PL4
12 10 8
BLU
BLK
GRN
SW 3
BLK
SW 7
RED
YEL
PL3
7 5 3 1
8 6 4 2
BRN
BRN
BLK
SW 4
BLU
BLU
YEL
RED
TO TS I GND LUG
SW 6
YEL
FITS RECEPTACLE SO 3
SW 12
LM 4
R12
TO TS I - LUG NO. 3
BRN
BLK
MODULATOR SECTION
R11
SO5
BLK
WH
WH
BLK
GRN
V3
V4
TS4
A
HOLES MARKED A ARE ACTUALLY ONE HOLE
BRN AND YEL
BLU
RY I
GRN
RED
GRN
RED
BLU
A

NOTE:

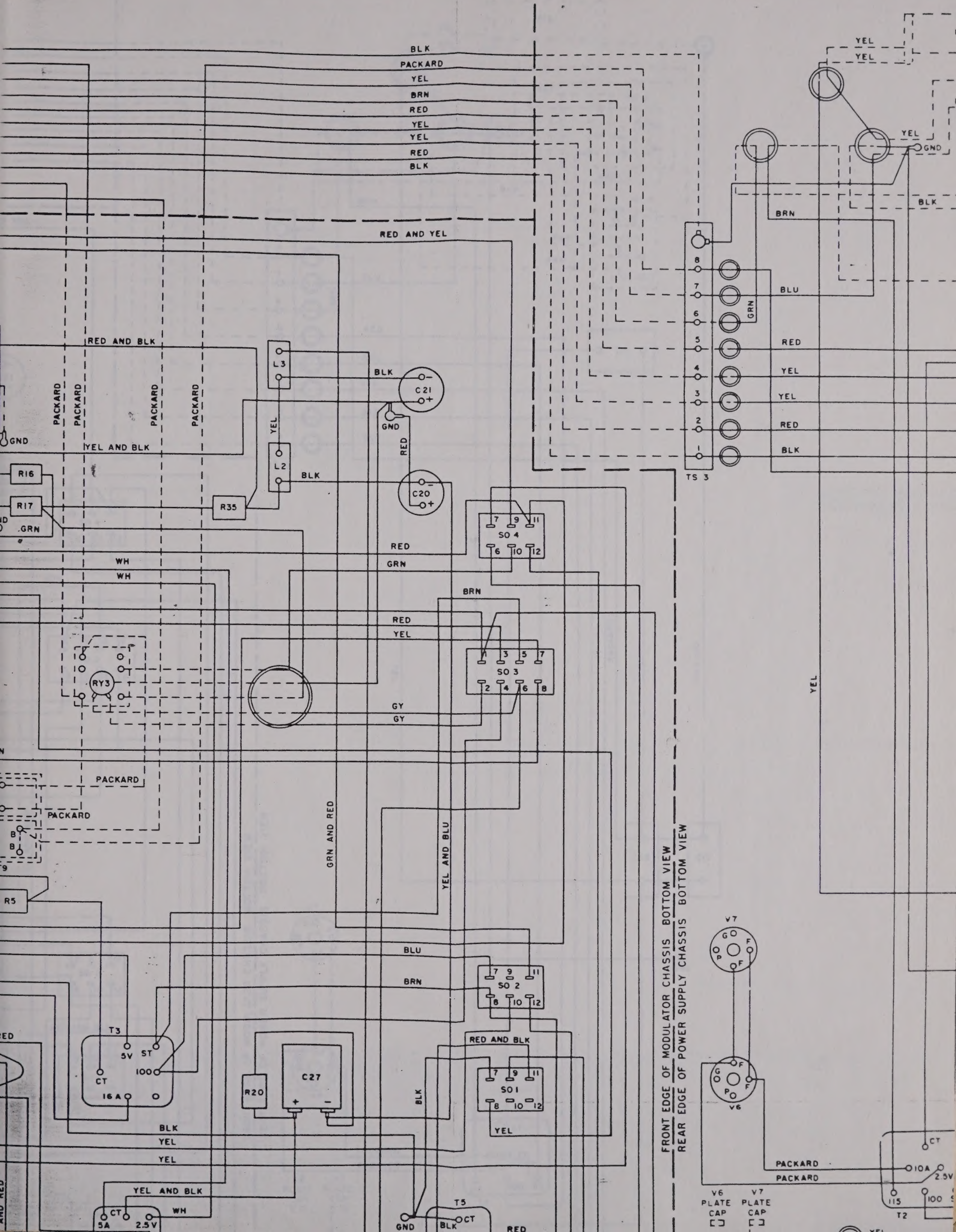
THIS DIAGRAM COVERS THE LATE E MODEL, STARTING WITH SERIAL NUMBER 5191 ON ORDER NO. 30204-P-43, AND EARLY E MODELS MODIFIED BY MWO SIG 11-281-6. ALL OTHER E MODELS HAVE THE FOLLOWING DIFFERENCES IN WIRING:

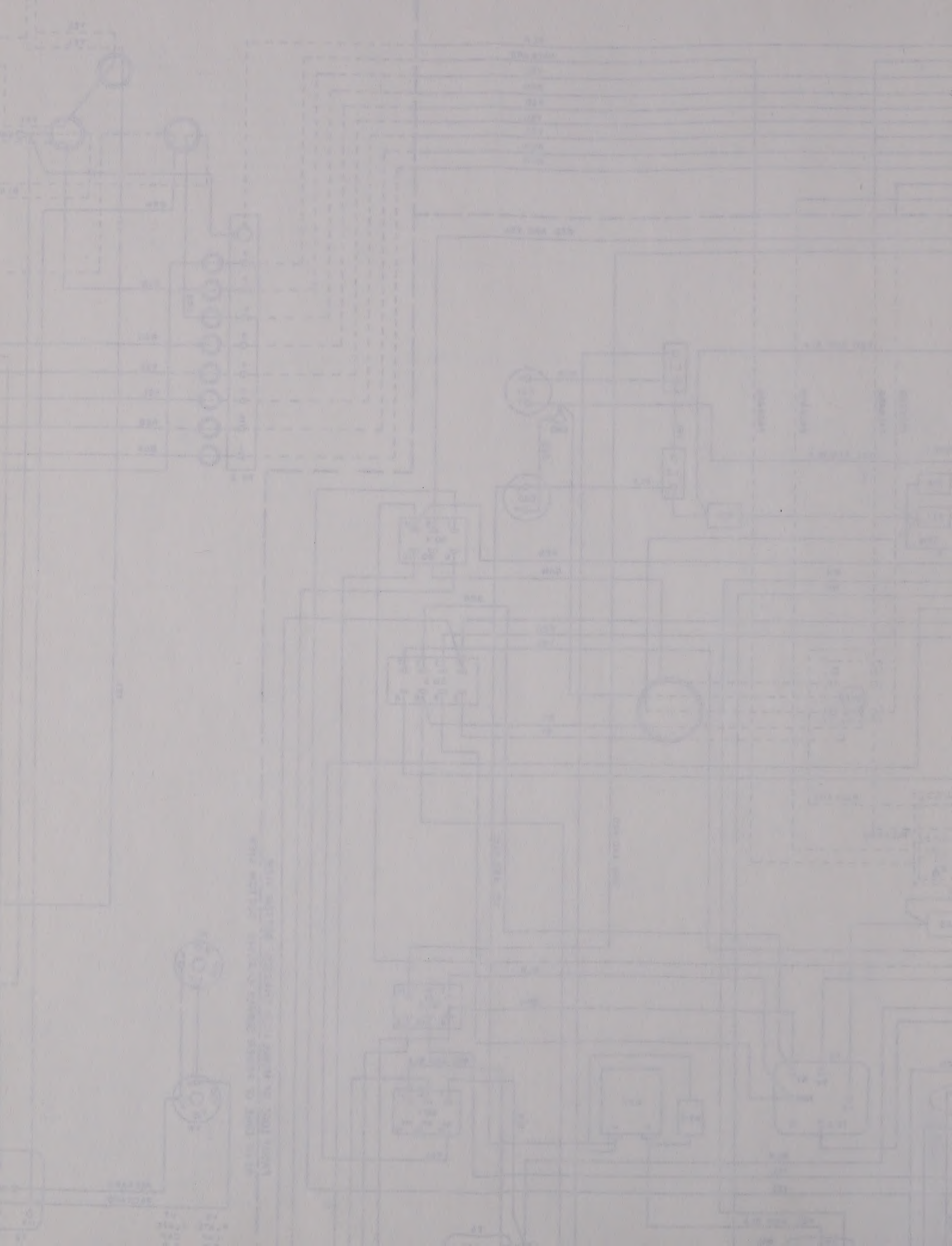
THE LEAD ON PIN 12 OF SO2 IS CONNECTED TO PIN 7 OF SO4.
THE LEADS ON PIN 11 OF SO4 ARE CONNECTED TO PIN 12 OF SO2.
THE LEAD BETWEEN PIN 10 OF SO2 AND PIN 7 OF SO4 IS CONNECTED BETWEEN PIN 10 OF SO2 AND PIN 11 OF SO4.

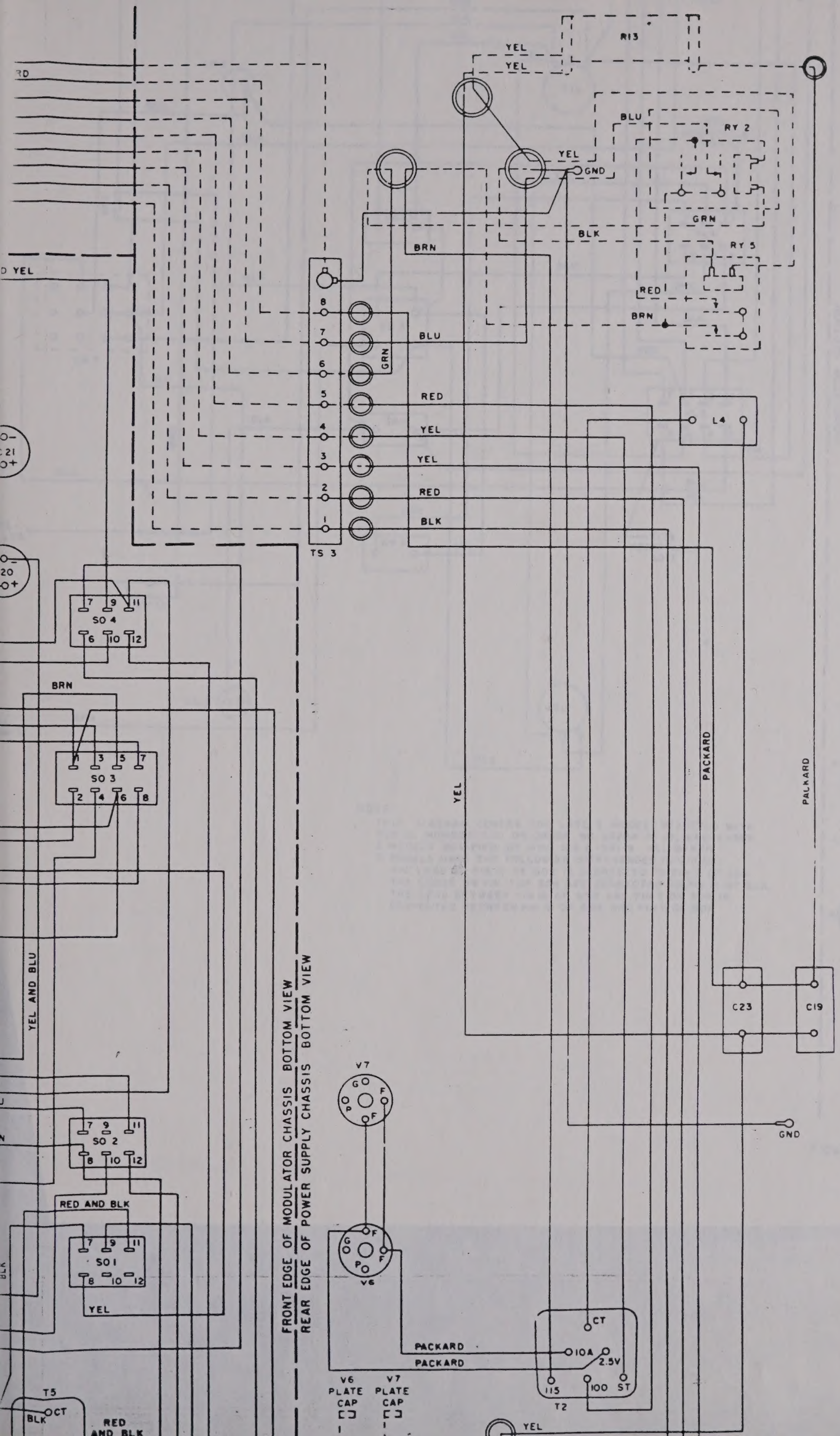
MODULATOR SECTION

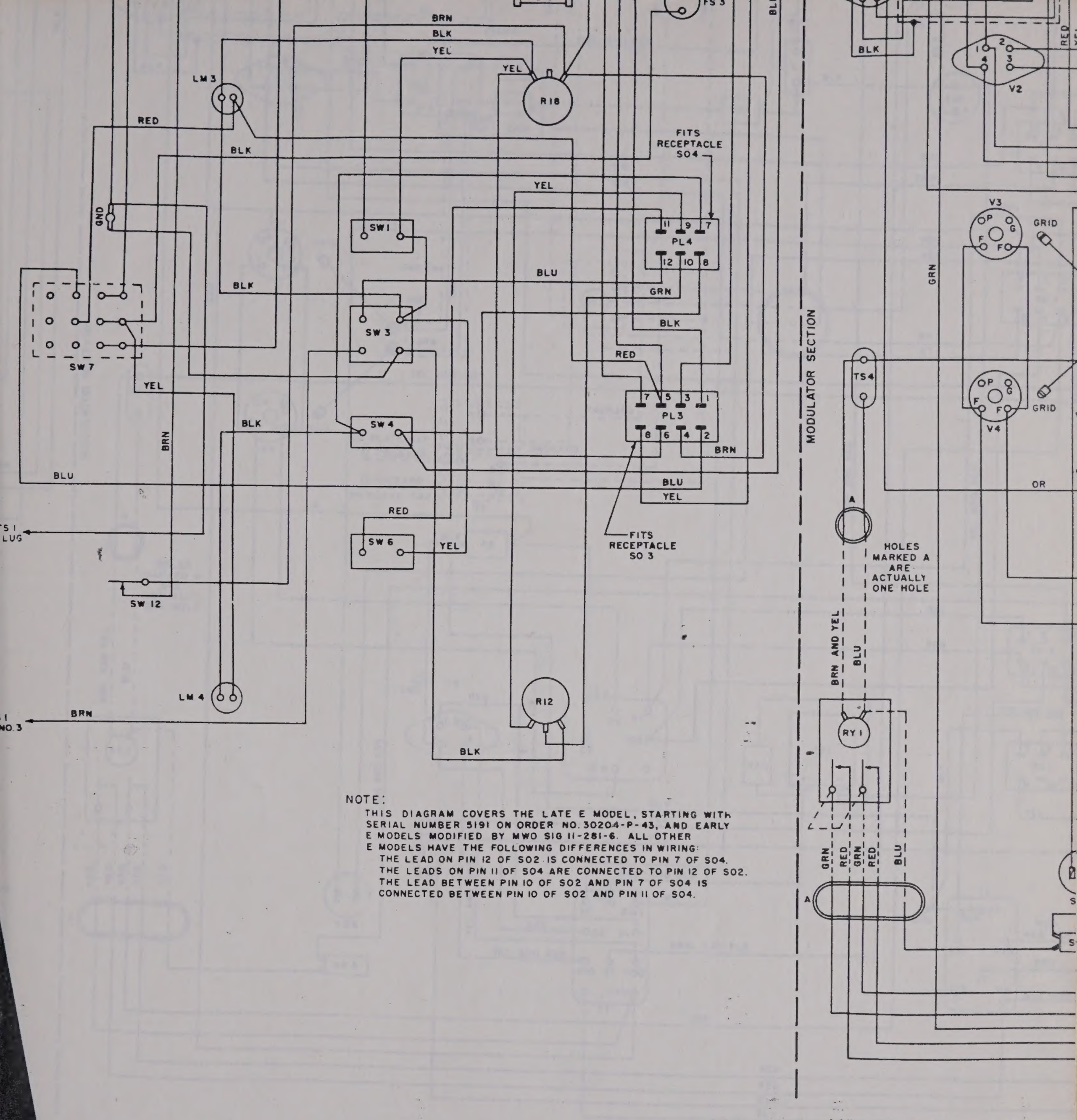


BLK
PACKARD
YEL
BRN
RED
YEL
YEL
RED
BLK
RED AND YEL
R11
RED AND BLK
T7
R14
R15
CT
G
SC
BLU
YEL
V1
SO5
BLK
WH
WH
YEL AND RED
YEL
GND
T8
P
F
CT
R16
R17
GRN
RED
YEL
V2
RED AND BLK
PACKARD
PACKARD
PACKARD
PACKARD
YEL AND BLK
L3
L2
YEL
BLK
C21
C20
RED
R35
SO 4
RED
GRN
WH
WH
BRN
RED
YEL
SO 3
GY
GY
V3
GRID
GND
GND
GRN
GRN
RY3
YEL AND BRN
TS4
V4
GRID
V3 PLATE CAP
PACKARD
PACKARD
V4 PLATE CAP
T9
PACKARD
PACKARD
GRN AND RED
YEL AND BLU
OR
A
HOLES MARKED A ARE ACTUALLY ONE HOLE
BLK
R5
BLU
SO 2
BRN
RED AND BLK
SO1
BLK
YEL
BRN AND YEL
BLU
RY1
GND
V5
RED
T3
5V
ST
CT
100
16 A
R20
C27
WH AND GRN
BLK
YEL
YEL
YEL AND BLK
WH
CT
R19
RED
T5
CT
GRN
RED
GRN
RED
BLU


BLK
PACKARD
YEL
BRN
RED
YEL
YEL
RED
BLK
RED AND YEL
RED AND BLK
PACKARD
YEL AND BLK
GND
R16
R17
.GRN
R35
L3
L2
C21
C20
BLK
GND
RED
YEL
WH
WH
RED
GRN
SO 4
BRN
RED
YEL
RY3
SO 3
GY
GY
PACKARD
PACKARD
R5
GRN AND RED
YEL AND BLU
BLU
BRN
SO 2
T3
5V
ST
CT
100
16 A
RED AND BLK
R20
C27
SO 1
YEL
BLK
YEL
YEL
YEL AND BLK
CT
5A
2.5V
WH
GND
BLK
T5
CT
RED
FRONT EDGE OF MODULATOR CHASSIS BOTTOM VIEW
REAR EDGE OF POWER SUPPLY CHASSIS BOTTOM VIEW
TS 3
BRN
BLU
GRN
RED
YEL
YEL
RED
BLK
YEL
YEL
YEL
GND
BLK
V7
V6
V6 PLATE CAP
V7 PLATE CAP
PACKARD
PACKARD
CT
10A
2.5V
115
100
T2




R13
YEL
YEL
BLU
RY 2
YEL
GND
GRN
BLK
RY 5
RED
BRN
BRN
TS 3
8
7
6
5
4
3
2
1
BLU
GRN
RED
YEL
YEL
RED
BLK
L4
D YEL
C 21
20
SO 4
7
9
11
6
10
12
BRN
SO 3
1
3
5
7
2
4
6
8
YEL AND BLU
SO 2
7
9
11
8
10
12
RED AND BLK
SO1
7
9
11
8
10
12
YEL
BLK
T5
BLK
CT
RED AND BLK
FRONT EDGE OF MODULATOR CHASSIS BOTTOM VIEW
REAR EDGE OF POWER SUPPLY CHASSIS BOTTOM VIEW
YEL
PACKARD
PALKARD
C23
C19
GND
V7
G
F
P
F
V6
G
F
F
P
PACKARD
PACKARD
V6 PLATE CAP
V7 PLATE CAP
CT
10A
2.5V
115
100
ST
T2
YEL


BRN
BLK
YEL
FS 3
BLU
YEL
LM 3
R18
RED
BLK
FITS RECEPTACLE SO4
YEL
GND
SW1
11 9 7
PL4
12 10 8
BLU
BLK
GRN
SW 3
BLK
SW 7
RED
YEL
7 5 3 1
PL3
8 6 4 2
SW 4
BLK
BRN
BRN
BLU
BLU
YEL
RED
TS 1 LUG
SW 6
YEL
FITS RECEPTACLE SO 3
SW 12
LM 4
R12
BRN
1 NO. 3
BLK
MODULATOR SECTION
BLK
V2
RED
YEL
V3
GRID
GRN
TS4
V4
GRID
OR
A
HOLES MARKED A ARE ACTUALLY ONE HOLE
BRN AND YEL
BLU
RY 1
GRN
RED
GRN
RED
BLU
A
S
S

NOTE:
THIS DIAGRAM COVERS THE LATE E MODEL, STARTING WITH SERIAL NUMBER 5191 ON ORDER NO. 30204-P-43, AND EARLY E MODELS MODIFIED BY MWO SIG 11-281-6. ALL OTHER E MODELS HAVE THE FOLLOWING DIFFERENCES IN WIRING:
THE LEAD ON PIN 12 OF SO2 IS CONNECTED TO PIN 7 OF SO4.
THE LEADS ON PIN 11 OF SO4 ARE CONNECTED TO PIN 12 OF SO2.
THE LEAD BETWEEN PIN 10 OF SO2 AND PIN 7 OF SO4 IS CONNECTED BETWEEN PIN 10 OF SO2 AND PIN 11 OF SO4.

Figure 85. Radio Transmitter BC–610–

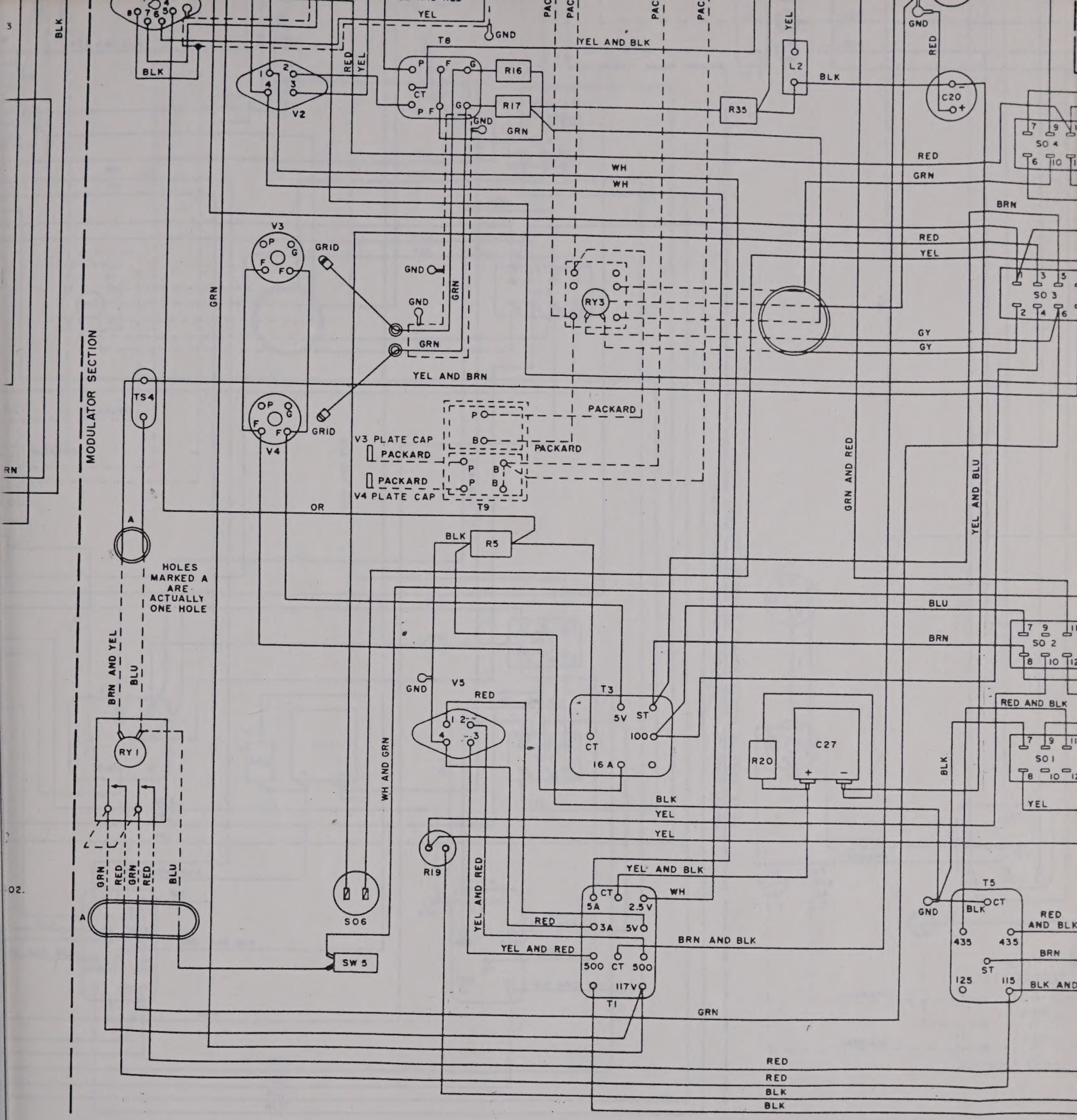
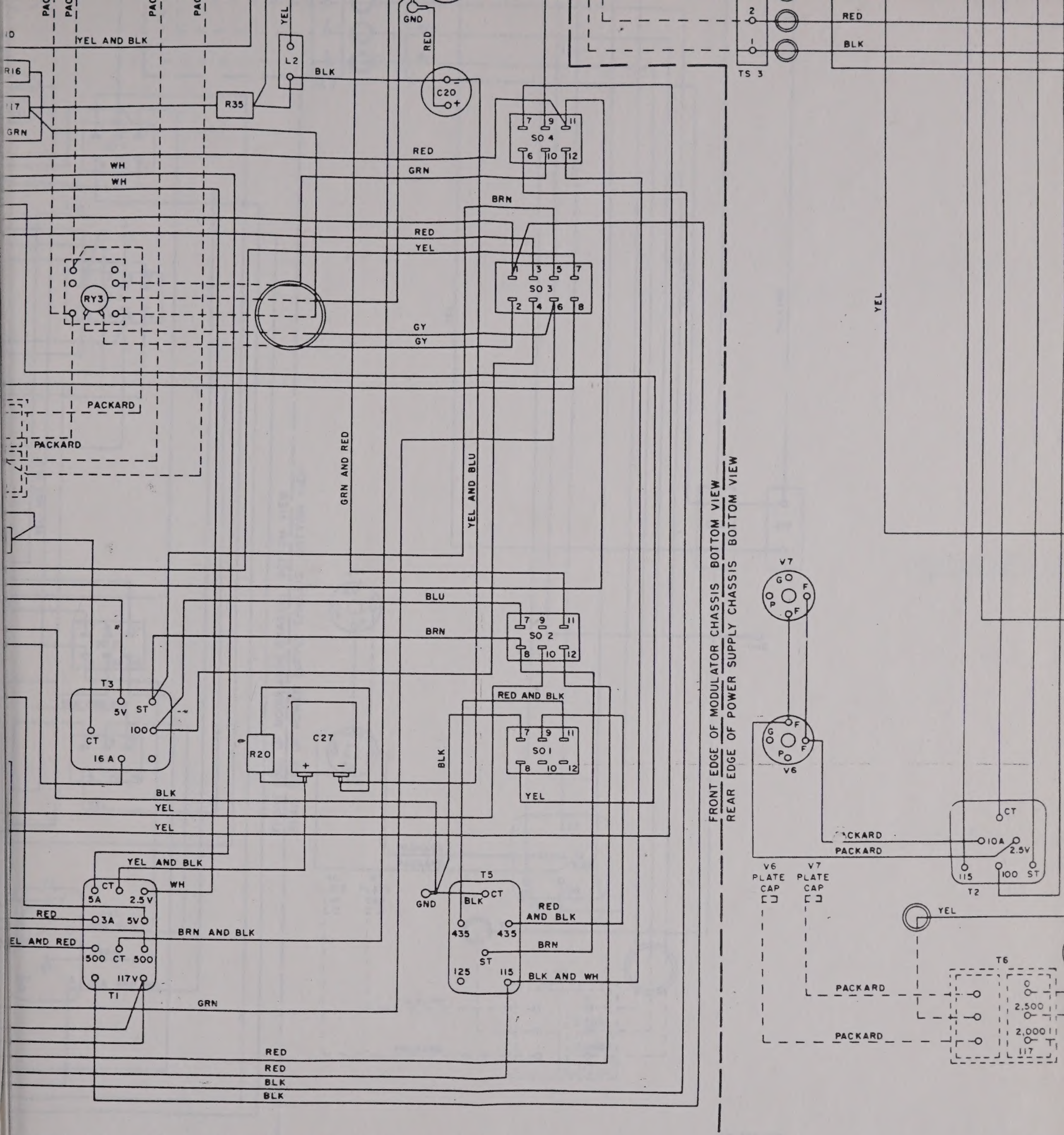
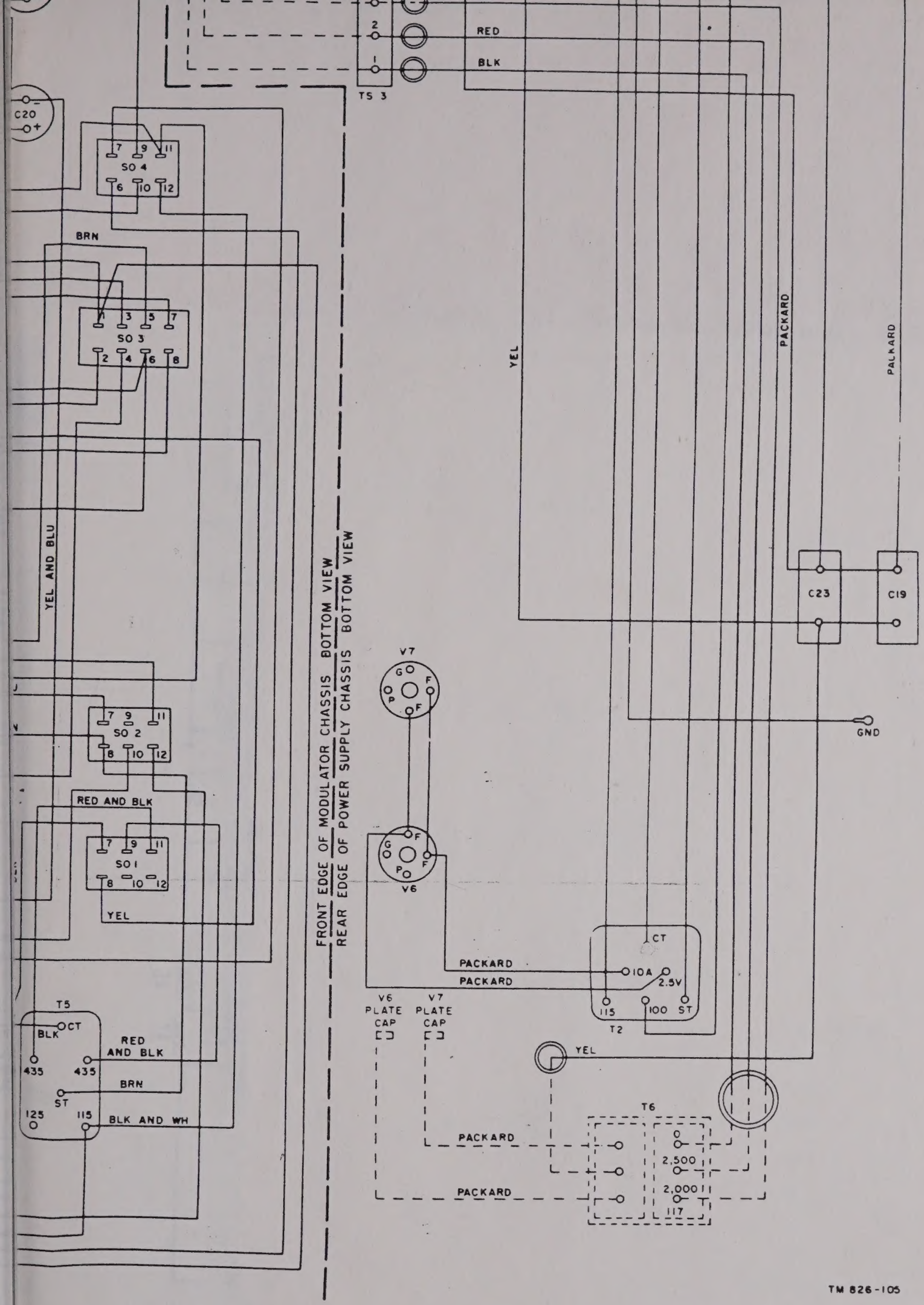

MODULATOR SECTION
BLK
RN
02.
YEL
GND
T8
V2
R16
R17
R35
L2
C20
YEL AND BLK
RED
YEL
BLK
GRN
WH
WH
RED
GRN
BRN
RED
YEL
GY
GY
SO 4
SO 3
SO 2
SO 1
V3
GRID
GND
GND
GRN
GRN
RY3
YEL AND BRN
TS4
V4
GRID
PACKARD
PACKARD
V3 PLATE CAP
PACKARD
PACKARD
V4 PLATE CAP
T9
OR
A
HOLES MARKED A ARE ACTUALLY ONE HOLE
GRN AND RED
YEL AND BLU
BLK
R5
BLU
BRN
RED AND BLK
BRN AND YEL
BLU
RY I
GND
V5
RED
WH AND GRN
T3
5V
ST
CT
100
16 A
R20
C27
BLK
YEL
YEL
YEL
R19
YEL AND RED
S06
GRN
RED
GRN
RED
BLU
A
SW 5
YEL AND BLK
CT
5A
2.5 V
WH
RED
3A
5V
BRN AND BLK
YEL AND RED
500
CT
500
117V
T1
GRN
T5
GND
CT
BLK
RED AND BLK
435
435
BRN
ST
125
115
BLK AND
RED
RED
BLK
BLK

Figure 85. Radio Transmitter BC–610–E, modulator deck, power supply deck, and front panel section, practical wiring diagram.

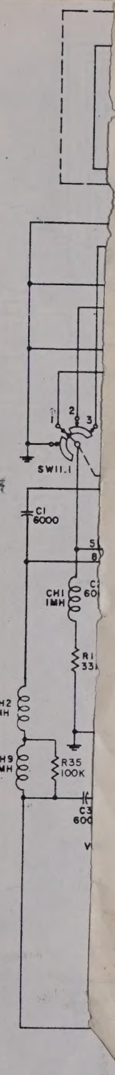

YEL AND BLK
YEL
GND
RED
L2
BLK
C20
R16
R35
117
GRN
RED
BLK
TS 3
2
1
SO 4
7
9
11
6
10
12
RED
GRN
WH
WH
BRN
RED
YEL
SO 3
1
3
5
7
2
4
6
8
RY3
GY
GY
PACKARD
PACKARD
GRN AND RED
YEL AND BLU
YEL
FRONT EDGE OF MODULATOR CHASSIS BOTTOM VIEW
REAR EDGE OF POWER SUPPLY CHASSIS BOTTOM VIEW
V7
G
F
P
F
BLU
BRN
SO 2
7
9
11
8
10
12
T3
5V
ST
100
CT
16 A
RED AND BLK
C27
R20
+
−
BLK
SO 1
7
9
11
8
10
12
YEL
V6
G
F
P
F
BLK
YEL
YEL
PACKARD
PACKARD
CT
10A
2.5V
115
100
ST
T2
V6 PLATE CAP
V7 PLATE CAP
YEL AND BLK
T5
GND
CT
BLK
CT
5A
2.5 V
WH
RED
3A
5V
RED AND BLK
BRN AND BLK
435
435
EL AND RED
500
CT
500
ST
BRN
125
115
BLK AND WH
117V
T1
GRN
YEL
T6
2,500
2,000
117
PACKARD
PACKARD
RED
RED
BLK
BLK

er supply deck, and front panel section, practical wiring

341205

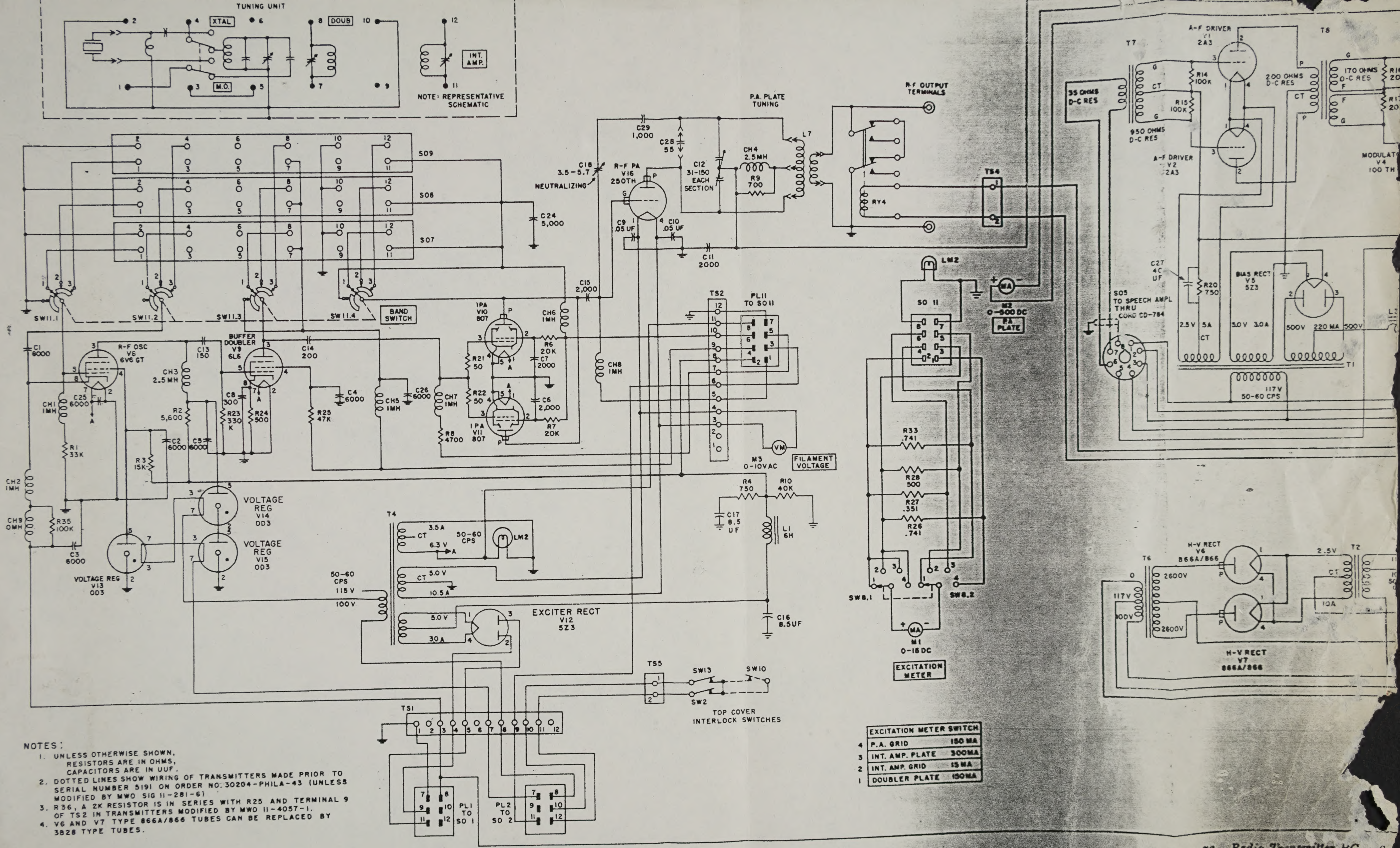

TS 3
2
1
RED
BLK
C20
SO 4
7
9
11
6
10
12
BRN
SO 3
1
3
5
7
2
4
6
8
YEL AND BLU
YEL
PACKARD
PALKARD
C23
C19
GND
FRONT EDGE OF MODULATOR CHASSIS BOTTOM VIEW
REAR EDGE OF POWER SUPPLY CHASSIS BOTTOM VIEW
V7
G
F
P
F
V6
SO 2
7
9
11
8
10
12
RED AND BLK
SO 1
7
9
11
8
10
12
YEL
T5
CT
BLK
435
435
RED AND BLK
BRN
ST
125
115
BLK AND WH
PACKARD
PACKARD
CT
10A
2.5V
115
100
ST
T2
V6 PLATE CAP
V7 PLATE CAP
YEL
T6
0
2,500
2,000
117
PACKARD
PACKARD

TM 826-105


1
2
3
SW11.1
C1
6000
5
8
CH1
1MH
C2
60
R1
33
CH2
1MH
CH9
0MH
R35
100K
C3
60
W

NOTES:

1. UNLESS OTHER
   RESISTORS AR
   CAPACITORS AR
2. DOTTED LINES SHO
   SERIAL NUMBER 5
   MODIFIED BY MWO
3. R36, A 2K RESIST
   OF TS2 IN TRANSM
4. V6 AND V7 TYPE
   3B28 TYPE TUBES


TUNING UNIT
XTAL
DOUB
M.O.
INT. AMP.
NOTE: REPRESENTATIVE SCHEMATIC
SO9
SO8
SO7
C24 5,000
SW11.1
SW11.2
SW11.3
SW11.4
BAND SWITCH
C1 6000
R-F OSC V5 6V6 GT
CH1 1MH
C25 6000
R1 33K
CH2 1MH
CH9 0MH
R35 100K
C3 6000
VOLTAGE REG V13 OD3
C13 150
CH3 2.5MH
R2 5,600
R3 15K
C2 6000
C5 6000
BUFFER DOUBLER V9 6L6
C8 300
R23 330 K
R24 500
C14 200
R25 47K
C4 6000
CH5 1MH
C26 6000
CH7 1MH
R8 4700
VOLTAGE REG V14 OD3
VOLTAGE REG V15 OD3
1PA V10 807
1PA V11 807
R21 50
R22 50
CH6 1MH
R6 20K
C7 2000
C6 2,000
R7 20K
C15 2,000
C18 3.5-5.7
NEUTRALIZING
C29 1,000
C28 55
R-F PA V16 250TH
C9 .05 UF
C10 .05 UF
C11 2000
P.A. PLATE TUNING
C12 31-150 EACH SECTION
CH4 2.5MH
R9 700
L7
R-F OUTPUT TERMINALS
RY4
TS4
CH8 1MH
TS2
PL11 TO SO11
M3 0-10VAC
FILAMENT VOLTAGE
R4 750
R10 40K
C17 8.5 UF
L1 6H
C16 8.5UF
T4
3.5A
CT
6.3 V
50-60 CPS
LM2
5.0 V
10.5 A
115 V
100 V
30 A
EXCITER RECT V12 5Z3
TS5
SW13
SW10
SW2
TOP COVER INTERLOCK SWITCHES
TS1
PL1 TO SO 1
PL2 TO SO 2
LM2
SO 11
M2 0-500 DC
P.A. PLATE
R33 .741
R28 500
R27 .351
R26 .741
SW8.1
SW8.2
M1 0-15DC
EXCITATION METER
35 OHMS D-C RES
T7
G
CT
R14 100K
R15 100K
950 OHMS D-C RES
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
200 OHMS D-C RES
T6
170 OHMS D-C RES
P
F
MODULATOR V4 100 TH
C27 4C UF
R20 750
SO5 TO SPEECH AMPL THRU CORD CD-784
BIAS RECT V3 5Z3
2.5V 5A
5.0V 3.0A
500V 220 MA 500V
117 V 50-60 CPS
T1
H-V RECT V6 866A/866
H-V RECT V7 866A/866
T6
2600V
117V
100V
2.5V
T2
10A

EXCITATION METER SWITCH		
4	P.A. GRID	150 MA
3	INT. AMP. PLATE	300MA
2	INT. AMP. GRID	15 MA
1	DOUBLER PLATE	150MA

NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. DOTTED LINES SHOW WIRING OF TRANSMITTERS MADE PRIOR TO SERIAL NUMBER 5191 ON ORDER NO. 30204-PHILA-43 (UNLESS MODIFIED BY MWO SIG 11-281-6)
3. R36, A 2K RESISTOR IS IN SERIES WITH R25 AND TERMINAL 9 OF TS2 IN TRANSMITTERS MODIFIED BY MWO 11-4057-1.
4. V6 AND V7 TYPE 866A/866 TUBES CAN BE REPLACED BY 3828 TYPE TUBES.

Figure 76. ***Radio Transmitter BC-***

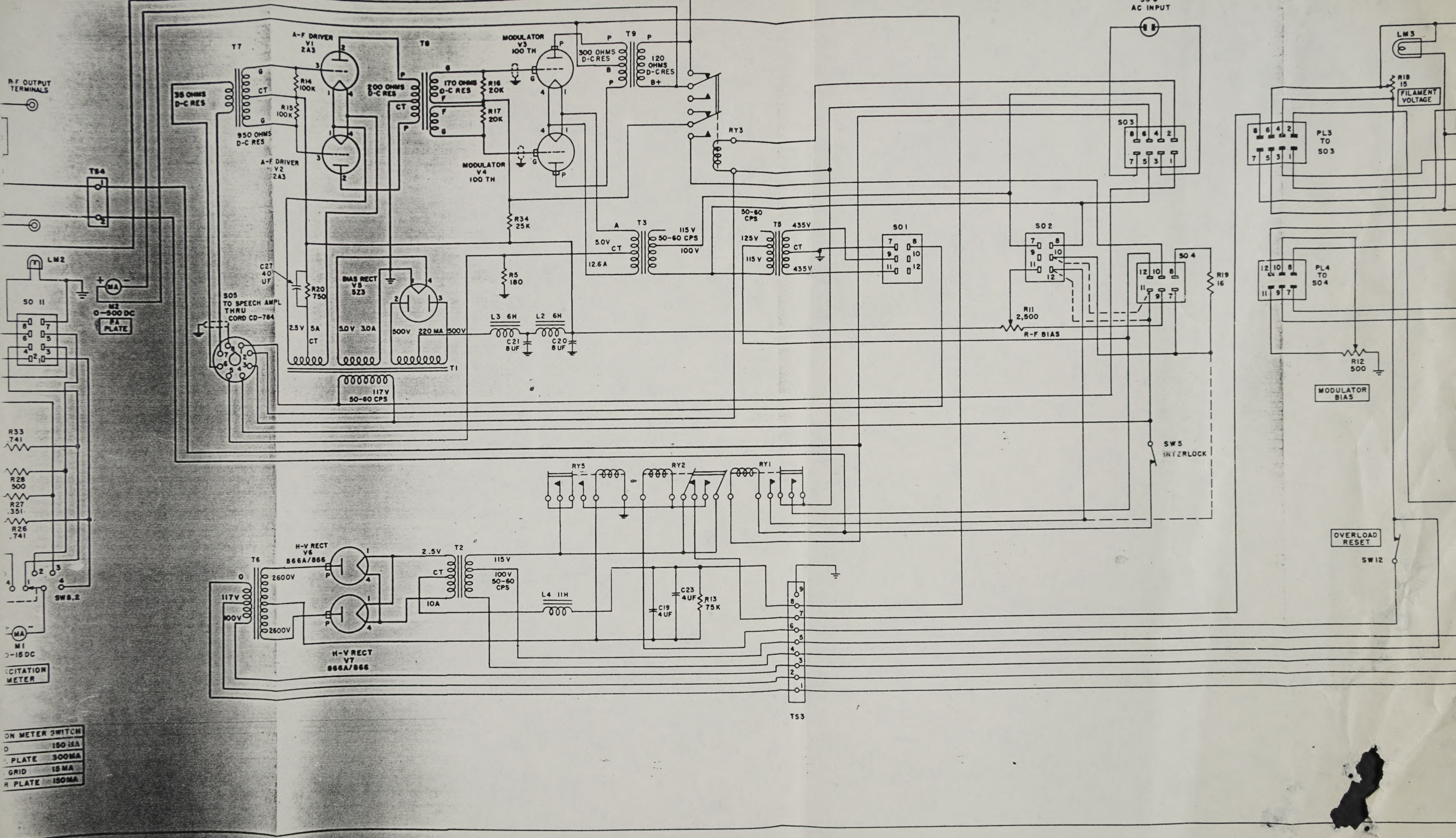
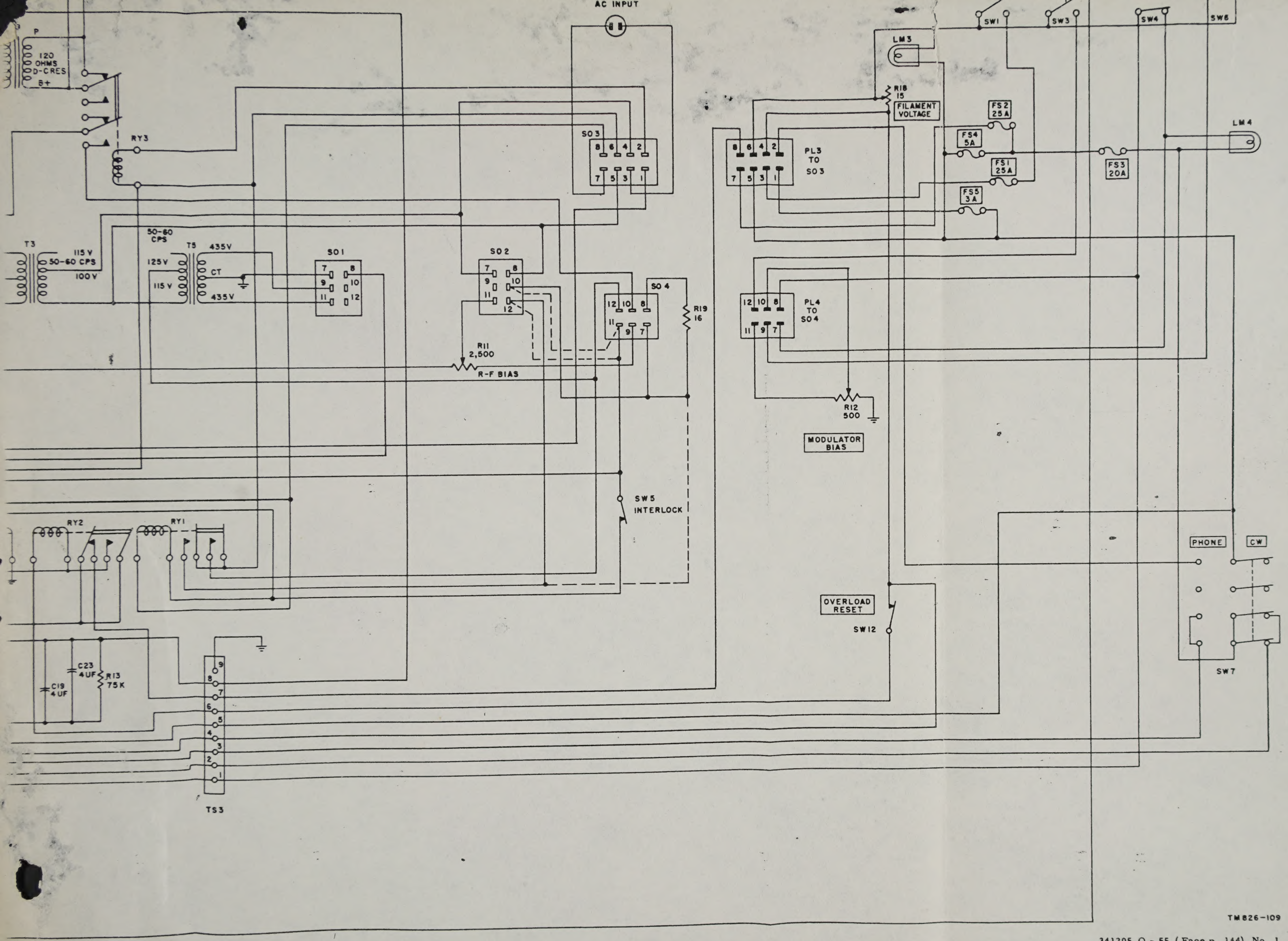

R-F OUTPUT TERMINALS
TS4
LM2
SO 11
M2
0—500 DC
PA PLATE
R33 .741
R28 500
R27 .351
R26 .741
SW8.2
MA
M1
0-15 DC
CITATION METER
ON METER SWITCH
D 150 MA
PLATE 300MA
GRID 15 MA
R PLATE 150MA
T7
35 OHMS D-C RES
950 OHMS D-C RES
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
R14 100K
R15 100K
T8
200 OHMS D-C RES
170 OHMS D-C RES
R16 20K
R17 20K
MODULATOR V3 100 TH
MODULATOR V4 100 TH
T9
300 OHMS D-C RES
120 OHMS D-C RES
B+
RY3
R34 25K
R5 180
C27 40 UF
R20 750
SO5 TO SPEECH AMPL THRU CORD CD-764
BIAS RECT V5 5Z3
2.5V 5A CT
5.0V 3.0A
500V 220 MA 500V
T1
117V 50-60 CPS
L3 6H
L2 6H
C21 8 UF
C20 8 UF
T3
5.0V CT 12.6A
115 V 50-60 CPS
100V
50-60 CPS
T5
125V
115 V
435V
CT
435V
SO1
SO2
SO3
SO4
R11 2,500
R-F BIAS
R19 16
AC INPUT
LM3
R18 15
FILAMENT VOLTAGE
PL3 TO SO3
PL4 TO SO4
R12 500
MODULATOR BIAS
SW5 INTERLOCK
RY5
RY2
RY1
OVERLOAD RESET
SW12
H-V RECT V6 866A/866
H-V RECT V7 866A/866
T6
117V
100V
2600V
2600V
T2
2.5V
CT
10A
115V
100V 50-60 CPS
L4 11H
C19 4 UF
C23 4UF
R13 75K
TS3

Figure 78. **Radio Transmitter** *BC–610–E, schematic diagram.*


AC INPUT
P
120 OHMS D-CRES
B+
RY3
SO3
8 6 4 2
7 5 3 1
PL3 TO SO3
LM3
SW1
SW3
SW4
SW6
R18 15
FILAMENT VOLTAGE
FS2 25A
FS4 5A
FS1 25A
FS5 3A
FS3 20A
LM4
T3
115 V 50-60 CPS
100 V
50-60 CPS
T5
125 V
115 V
435 V
CT
435 V
SO1
7 8
9 10
11 12
SO2
SO4
12 10 8
11 9 7
R19 16
PL4 TO SO4
R11 2,500
R-F BIAS
R12 500
MODULATOR BIAS
SW5 INTERLOCK
RY2
RY1
OVERLOAD RESET
SW12
PHONE
CW
SW7
C23 4UF
R13 75K
C19 4UF
TS3
1 2 3 4 5 6 7 8 9

TM826-109

341205 O - 55 (Face p. 144) No. 1

INSTRUCTION BOOK
FOR
RADIO TRANSMITTER BC-610-I

Manufactured by
the hallicrafters co.
Orders No. 1908-Phila-51-01-C, 3167-Phila-51 and 3201-Phila-51
15 October 1951

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System application	4	2
Technical characteristics	5	5
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WARNING

HIGH VOLTAGE

is used in the operation
of this equipment.

DEATH ON CONTACT

may result if personnel fail
to observe safety precautions.

Be careful not to contact high-voltage connections or 115-volt input connections when installing or operating this equipment. When working inside the equipment, after the power has been turned off, always short-circuit the high-voltage capacitors.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:
Antenna Tuning Unit BC-939-B
Radio Transmitter BC-610-I

First Aid for Electric Shock

RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(*1*) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(*2*) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(*3*) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(*4*) the operator's elbows are straight and locked.

f. The resuscitation procedure is as follows:

(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit on the heels.

(*3*) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4

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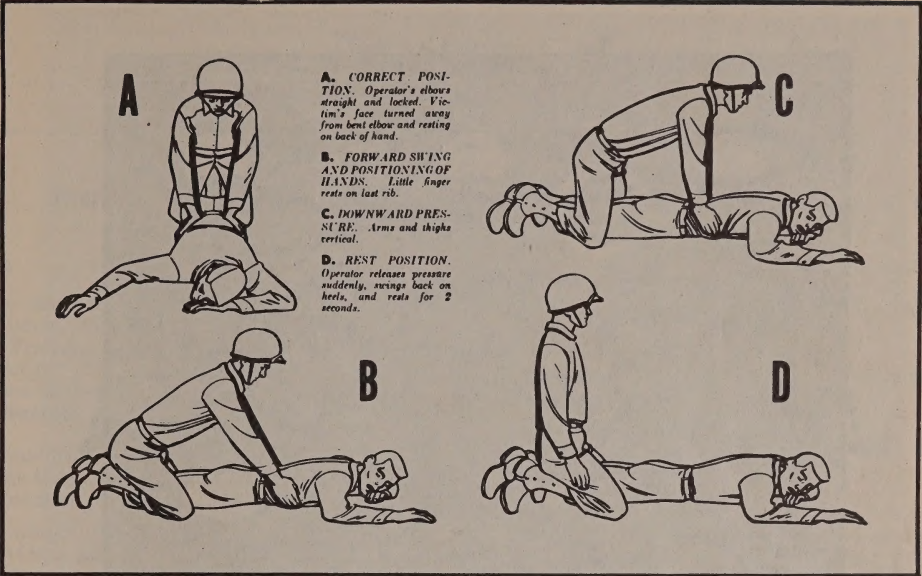


A. *CORRECT POSITION. Operator's elbows straight and locked. Victim's face turned away from bent elbow and resting on back of hand.*

B. *FORWARD SWING AND POSITIONING OF HANDS. Little finger rests on last rib.*

C. *DOWNWARD PRESSURE. Arms and thighs vertical.*

D. *REST POSITION. Operator releases pressure suddenly, swings back on heels, and rests for 2 seconds.*

seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing ½ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*

TL15338-E

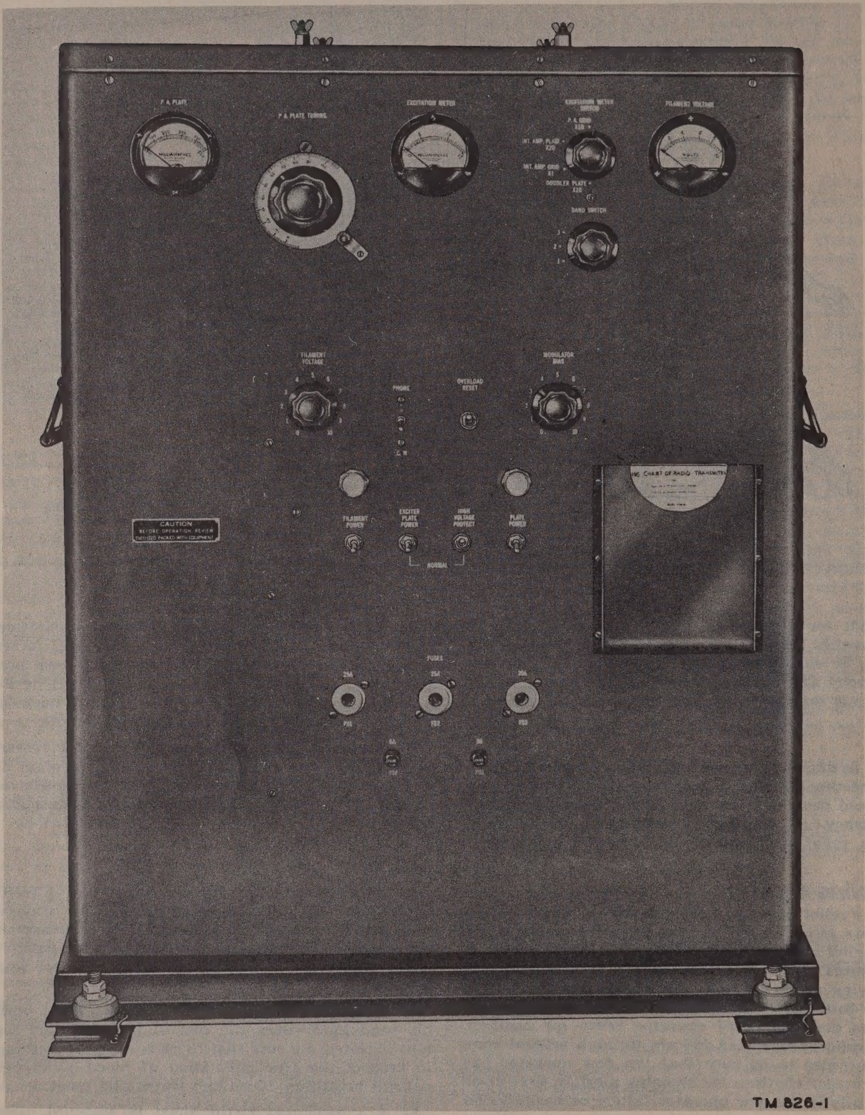

P. A. PLATE
P. A. PLATE TUNING
EXCITATION METER
FILAMENT VOLTAGE
BAND SWITCH
FILAMENT VOLTAGE
PHONE
OVERLOAD RESET
MODULATOR BIAS
C. W.
CAUTION
FILAMENT POWER
EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
PLATE POWER
NORMAL
FUSES
TM 826-1

Figure 1. Radio Transmitter BC-610-I.

Note. This instruction book will be replaced by TM 11-826 which, when published, will be listed in SR-310-20-2.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This instruction book contains instructions for the installation, operation, maintenance, and repair of Radio Transmitter BC-610-I (fig. 1) and Antenna Tuning Unit BC-939-B (fig. 2) . In addition to these instructions there are two appendixes covering a list of references and an identification table of parts.

b. Official nomenclature followed by (*) is used to indicate the following models of equipments referred to in this manual:

Speech Amplifier BC-614-(*): E and H models.
Amplifier AM-141(*)/MRC: Basic, A, and B models.
Antenna Tuning Unit BC-939-(*): A and B models.
Control Unit C-292(*)/TRA-7: Basic, A, and B models.
Power Unit PE-95-(*): All models.
Radio Receiver BC-312-(*): All models.
Radio Receiver BC-342-(*): All models.
Radio Set AN/GRC-26(*): Basic and A models.
Radio Set AN/MRC-2(*): Basic, A, and B models.
Radio Sets SCR-399 and SCR-499: A and B models.
Radio Transmitter BC-610-(*): E through I models and T-213/GRC-26.
Rectifier RA-63-(*): Basic through E models.
Speech amplifier BC-614-(*): E, H, and I models.
Telephone EE-8-(*): Basic, A, and B models.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army materiel and equipment.

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army), NAV DEPT SERIAL 85P00 (Navy), and AFR 71-4 (Air Force).

b. DA AGO Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700-45-5.

c. USAF Form 54, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AFR 65-26.

d. DA AGO Form 419, Preventive Maintenance Checklist for Signal Corps Equipment, will be prepared in accordance with instructions on the back of the form.

e. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Transmitter BC-610-I is a medium power radio frequency transmitter which will transmit voice or c-w (continuous-wave) signals over a range of more than 100 miles. The frequency range of the transmitter is 2 to 13 mc (megacycles). This frequency range is covered by means of eight plug-in tuning units, seven plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and associated coil unit, or coil unit with capacitor, covers a portion of the range. Refer to table I. The transmitter frequency is controlled by the master oscillator or the crystal oscillator, depending upon the position of the M.O.-XTAL switch on the tuning unit. At frequencies below 8 mc, the power output of the transmitter exceeds 400 watts on c-w and 300 watts on voice or mcw (modulated continuous waves). The power output is somewhat less at the higher frequencies than at the lower ones. The transmitter will operate satisfactorily with input power of 1,700 to 2,000 watts from a 115-volt, 50- to 60 cycle a-c (alternating current) source.

b. This transmitter may also be used for transmitting RTT (radioteletype) signals on an FS (frequency shift) basis. For this type of operation, an r-f (radio-frequency) exciter unit is used instead of the oscillator section of the transmitter. Signals from the exciter unit are connected to the oscillator section of the transmitter through the crystal socket of the transmitter tuning units. The exciter unit shifts the frequency of the transmitter r-f output in accordance with the radio TT (teletypewriter) signal input to the exciter unit. Radio Transmitter BC-610-I may be used in mobile operation or in a fixed station. A doublet antenna, cut to the proper length to match the operating frequency, should be used for fixed station operation. For mobile opera-

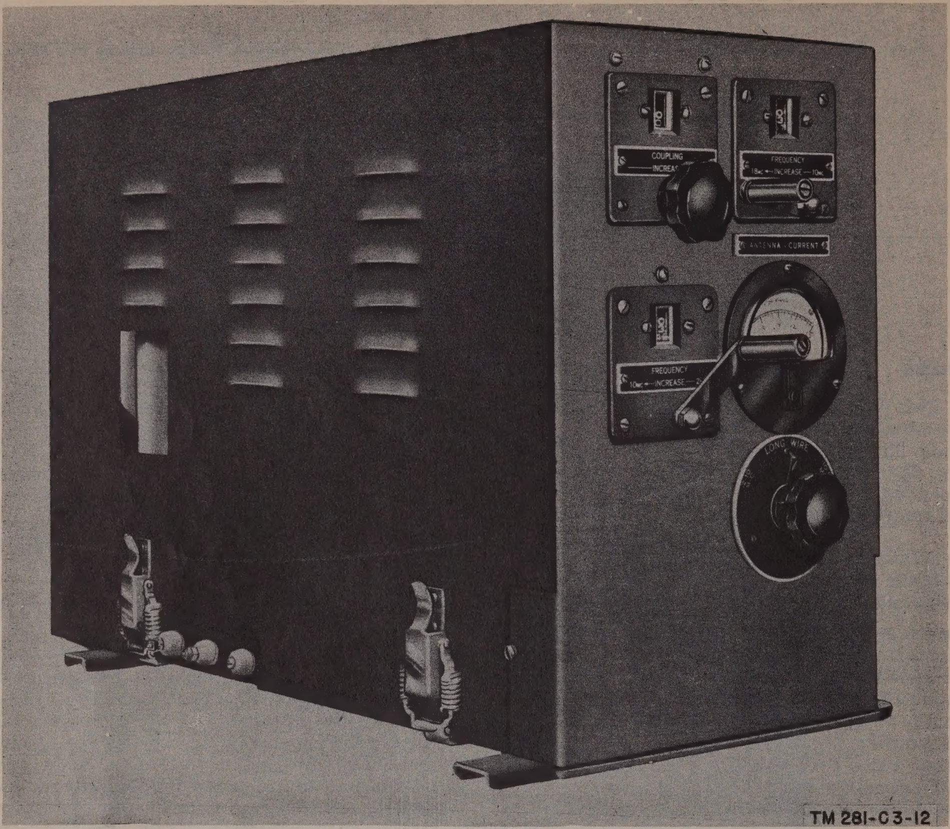


Figure 2. Antenna Tuning Unit BC-939-B.

tion, a whip antenna is used with Antenna Tuning Unit BC-939-B.

4. System Application

a. General. The usefulness of Radio Transmitter BC-610-I as a single unit is limited. In this capacity it may be used to send code (c-w) signals by interrupting the r-f carrier. To be more useful, the transmitter must be incorporated into a radio system where it becomes a basic component, has accessories, and works in conjunction with other major components to allow more intelligence to be placed on the r-f carrier. Generally, this transmitter is used in a system which requires communications in both directions, therefore necessitating receiving equipment. To properly coordinate operation of both the transmitting and receiving gear, these systems contain a control section for efficient and rapid control. Radio systems are portions of network, similar to telephone systems, and often are used to replace or supplement these systems. The amount of traffic the system will carry or the type of intelligence to be sent are the biggest factors in determining the complexity of the system. Some systems will handle c-w, some phone, some facsimile, and some teletypewriter signals. It is possible for one system to handle several or all of these types of communications. Radio systems are designed to operate in different frequency ranges. Radio Transmitter BC-610-I is used with equipment operating in a range of 2 to 18 mc. Examples of radio systems in which Radio Transmitter BC-610-I is incorporated are: Radio Sets SCR-399-B, SCR-499-B, AN/GRC-26A, and AN/MRC-2B. Each of these systems will be described briefly in subparagraphs b through d below. Although these systems are representative of the uses of Radio Transmitter BC-610-I, note that they do not constitute all possible uses.

b. Radio Sets SCR-399-B and SCR-499-B. Radio Sets SCR-399-B and SCR-499-B are designed for c-w (code) and mcw (voice) communications at locations near the front lines. The approximate range is 250 miles for c-w and 100 miles for phone. Both of these radio

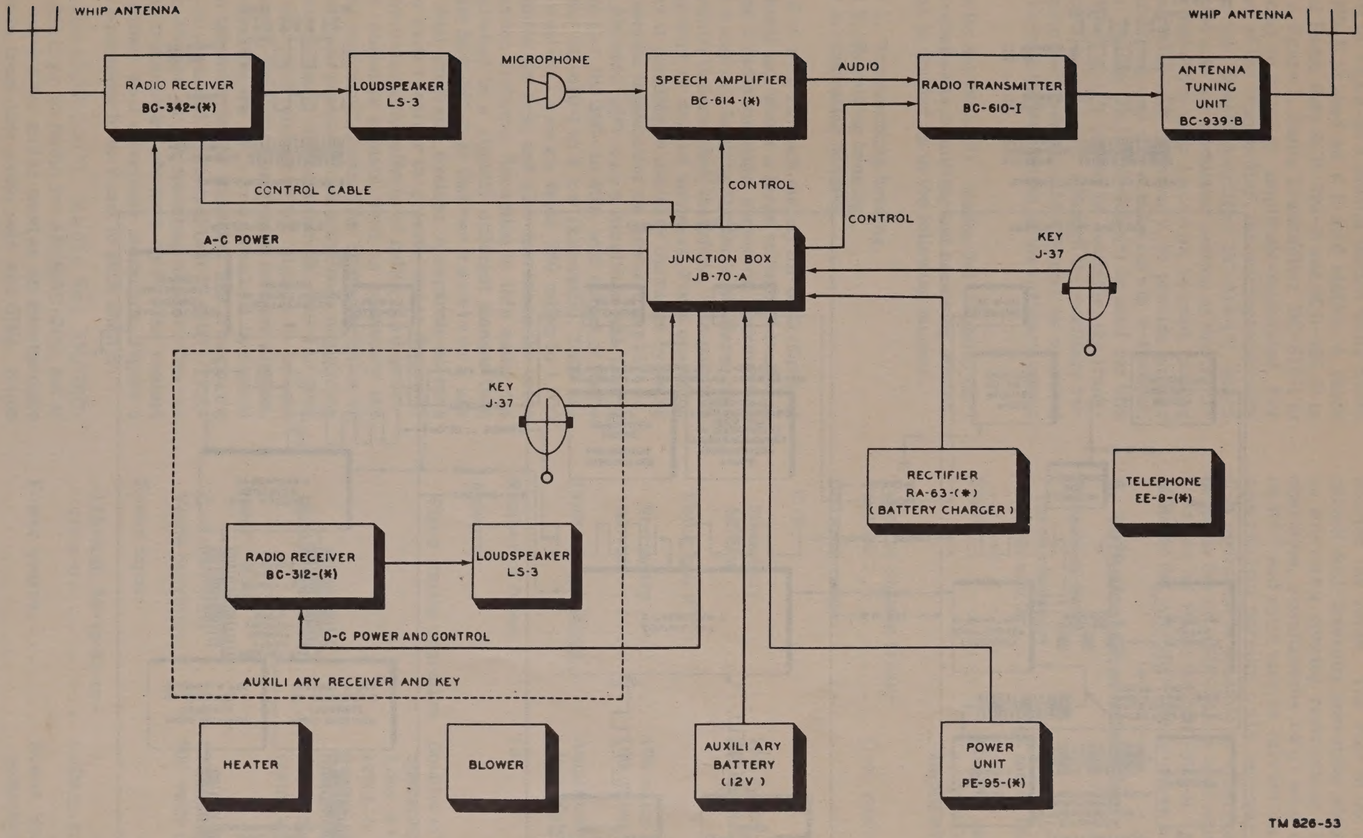

WHIP ANTENNA
RADIO RECEIVER BC-342-(*)
LOUDSPEAKER LS-3
MICROPHONE
SPEECH AMPLIFIER BC-614-(*)
AUDIO
RADIO TRANSMITTER BC-610-I
ANTENNA TUNING UNIT BC-939-B
WHIP ANTENNA
CONTROL CABLE
CONTROL
CONTROL
A-C POWER
JUNCTION BOX JB-70-A
KEY J-37
KEY J-37
RADIO RECEIVER BC-312-(*)
LOUDSPEAKER LS-3
D-C POWER AND CONTROL
AUXILI ARY RECEIVER AND KEY
RECTIFIER RA-63-(*) (BATTERY CHARGER)
TELEPHONE EE-8-(*)
HEATER
BLOWER
AUXILI ARY BATTERY (12V)
POWER UNIT PE-95-(*)
TM 826-53

Figure 3. Block diagram of Radio Sets SCR-399-B and SCR-499-B.

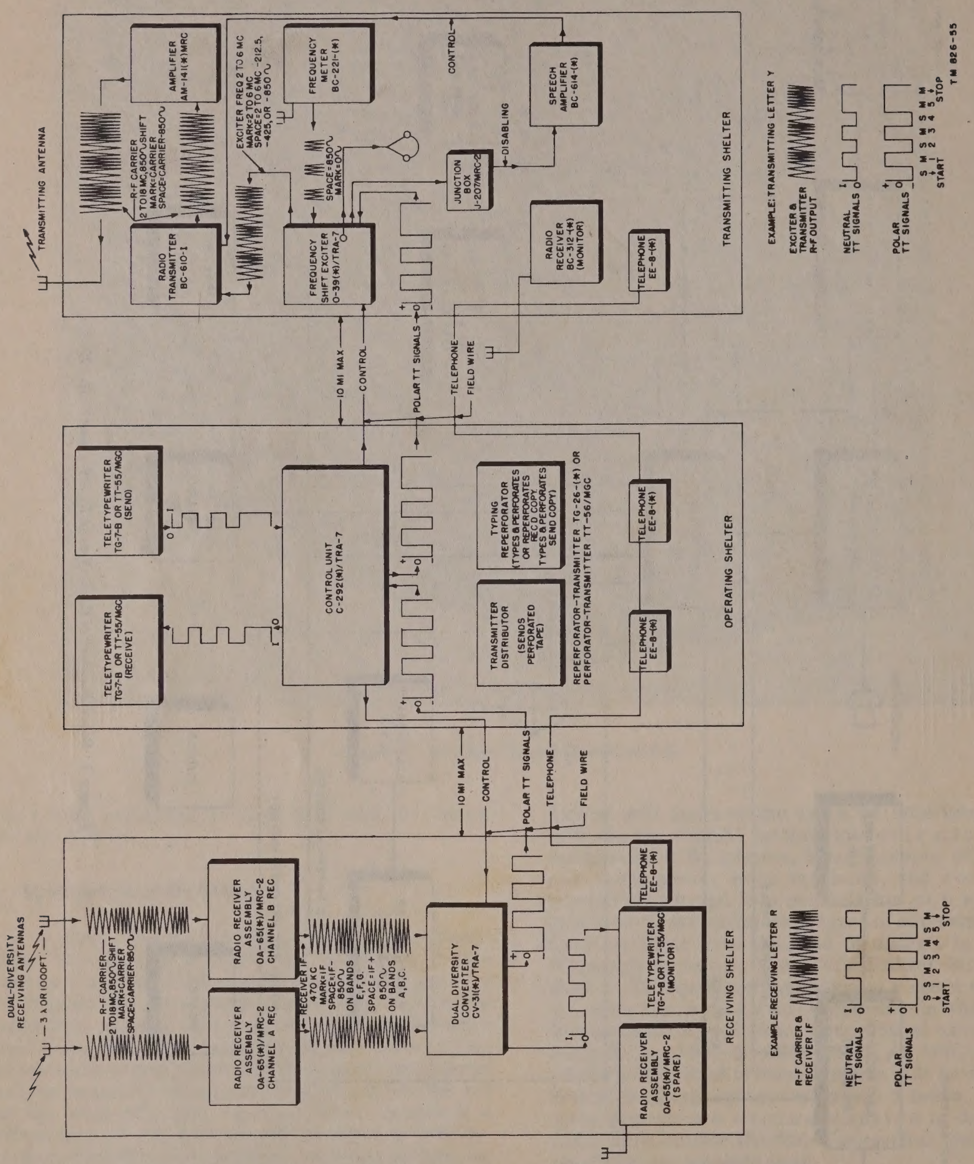

DUAL-DIVERSITY RECEIVING ANTENNAS
3 λ OR 1000 FT.
R-F CARRIER 2 TO 18 MC, 850~ SHIFT MARK=CARRIER SPACE=CARRIER-850~
RADIO RECEIVER ASSEMBLY OA-65(*)/MRC-2 CHANNEL A REC
RADIO RECEIVER ASSEMBLY OA-65(*)/MRC-2 CHANNEL B REC
RECEIVER IF 470 KC MARK=IF SPACE=IF-850~ ON BANDS E,F,G. SPACE=IF+850~ ON BANDS A,B,C.
DUAL DIVERSITY CONVERTER CV-31(*)/TRA-7
TELEPHONE EE-8-(*)
TELETYPEWRITER TG-7-B OR TT-55/MGC (MONITOR)
RADIO RECEIVER ASSEMBLY OA-65(*)/MRC-2 (SPARE)
RECEIVING SHELTER
10 MI MAX
CONTROL
POLAR TT SIGNALS
TELEPHONE
FIELD WIRE
TELETYPEWRITER TG-7-B OR TT-55/MGC (RECEIVE)
TELETYPEWRITER TG-7-B OR TT-55/MGC (SEND)
CONTROL UNIT C-292(*)/TRA-7
TRANSMITTER DISTRIBUTOR (SENDS PERFORATED TAPE)
TYPING REPERFORATOR (TYPES & PERFORATES REC'D COPY OR REPERFORATES TYPES & PERFORATES SEND COPY)
REPERFORATOR-TRANSMITTER TG-26-(*) OR PERFORATOR-TRANSMITTER TT-56/MGC
TELEPHONE EE-8-(*)
TELEPHONE EE-8-(*)
OPERATING SHELTER
TRANSMITTING ANTENNA
R-F CARRIER 2 TO 18 MC, 850~ SHIFT MARK=CARRIER SPACE=CARRIER-850~
RADIO TRANSMITTER BC-610-I
AMPLIFIER AM-141(*)MRC
EXCITER FREQ 2 TO 6 MC MARK=2 TO 6 MC SPACE=2 TO 6 MC -212.5, -425, OR -850~
FREQUENCY METER BC-221-(*)
FREQUENCY SHIFT EXCITER O-39(*)/TRA-7
SPACE=850~ MARK=0~
JUNCTION BOX J-207/MRC-2
DISABLING
CONTROL
SPEECH AMPLIFIER BC-614-(*)
RADIO RECEIVER BC-312-(*) (MONITOR)
TELEPHONE EE-8-(*)
TRANSMITTING SHELTER
EXAMPLE: RECEIVING LETTER R
R-F CARRIER & RECEIVER IF
NEUTRAL TT SIGNALS
POLAR TT SIGNALS
START S S 1 M 2 S 3 M 4 S 5 M STOP
EXAMPLE: TRANSMITTING LETTER Y
EXCITER & TRANSMITTER R-F OUTPUT
NEUTRAL TT SIGNALS
POLAR TT SIGNALS
START S 1 M 2 S 3 M 4 S 5 M M STOP
TM 826-55

Figure 4. Block diagram of Radio Set AN/MRC-2B.

sets are basically the same. However, Radio Set SCR-399-B is used as a mobile station while Radio Set SCR-499-B is used as a fixed station. A block diagram of Radio Sets SCR-399-B and SCR-499-B is shown in figure 3. Radio Transmitter BC-610-I is used and may be keyed or amplitude-modulated. For modulation of the transmitter, the microphone feeds the audio into Speech Amplifier BC-614-(*), which in turn is fed into the modulator section of the transmitter. Ordinarily a whip antenna is used, making an antenna tuning unit necessary, to provide proper antenna matching and give maximum r-f output. Antenna Tuning Unit BC-939-(*) is used for this purpose. When no a-c power is available, the transmitter cannot be operated, although the auxiliary receiver (Radio Receiver BC-312-(*)) may be operated from the 12-volt battery which is the auxiliary power source.

c. Radio Set AN/MRC-2(*). Radio Set AN/MRC-2(*) is a three-shelter transmitting and receiving station. The station is divided up in the following manner.

Shelter 1. Transmitting housing.
Shelter 2. Receiving housing.
Shelter 3. Operating housing.

This radio set is used mainly for GHQ (General Headquarters) use where a large volume of traffic is carried and a radio message center or coordination point is needed. In using the three shelters, only fixed operation is demanded; therefore, it is possible to use long wire or doublet antennas. Fixed operation also makes it possible to increase the range by using a more powerful transmitter or power amplifier. Radio Set AN/MRC-2(*) uses Amplifier AM-141(*)/MRC to boost the 300- to 400- watt output of Radio Transmitter BC-610-I to 2 kw (kilowatts). This extends the normal range from 250 miles to 1,000 miles or more for c-w, and also increases the voice communication distance. Reception in this radio set is accomplished in a slightly different manner than in Radio Set SCR-399-B in that two receivers are used in a dual diversity system. A separate antenna is used for each receiver to provide space diversity signals, minimizing the effects of fading and providing more consistent signals. This is necessary for RTT signal communications. The characteristics of FS radioteletype signals allows amplitude modulation to be placed on Radio Transmitter BC-610-I to provide both voice and teletypewriter signals to be sent simultaneously without interference between signals. The three shelters are interconnected by control wires, and the selection of incoming and outgoing messages is governed by Control Unit C-292(*)/TRA-7 which is located in the operating shelter. The receiving and transmitting shelters serve as contact points to gather and distribute messages. Figure 4 shows the equipment to be found in each shelter.

d. Radio Set AN/GRC-26(*). Radio Set AN/GRC-26(*) is similar to Radio Set AN/MRC-2(*), but is housed in one shelter and is used as an intermediate step between front-line radio sets and GHQ. Radio Set AN/GRC-26(*) may be made fixed or used mobile; however, as a mobile unit, it has limitations. Mobile operation requires the use of whip antennas which shorten the range. The size of the shelter does not permit dual-diversity operation while in motion due to antenna spacing restrictions. In fixed station operation, simultaneous two-way communications on RTT and voice may be carried on, but mobile operation permits only one-way RTT operation. C-w operation is possible in emergency. The range of Radio Set AN/GRC-26A is approximately the same as that of Radio Set SRC-399-B. A block diagram of Radio Set AN/GRC-26A is shown in figure 5.

5. Technical Characteristics

Frequency range:	
Three channels (1, 2, and 3).	2 mc to 18 mc.
Circuit	Master oscillator, buffer amplifier, and power amplifier.
Types of signals transmitted	C-w, voice, and RTT
Distance range:	
C-w:	
Stationary	250 miles.
Moving	250 miles.
Voice and RTT:	
Stationary	100 miles.
Moving	100 miles.
Type of modulation	Amplitude and FS (simultaneously).
Number of tubes.	16.
Antennas:	
Fixed station operation.	Doublet of length to match operating frequency. Long wire and ground, length to match frequency of operation with tuning unit.
Mobile operation	Whip type with antenna tuning unit.
Power output:	
C-w operation	400 watts (approximately).
Voice operation	300 watts (approximately).
Power input:	
115-volt, 50-to 60-cycle a-c.	1,700 to 2,000 watts.
Power source.	Power Unit PE-95-(*) or commercial source.
Weight	401 pounds.

6. Packaging Data

Packaging data relevant to Radio Transmitter BC-610-I is contained in the respective over-all system manual of Radio Sets SCR-399-B, SCR-499-B, AN/MRC-2(*), or AN/GRC-26(*). For information concerning the packaging of this transmitter in any of the above listed systems, refer to the appropriate technical manual. The transmitter normally is not packaged separately when used as part of the above systems; it is bolted to the deck of the transmitting shelter and the connecting cables are installed.

7. Description of Transmitter

a. The transmitter assembly is made up of three chassis (fig. 6). The top chassis (fig. 7) is referred to as the r-f section and includes all of the r-f components. The center section is called the modulator section since it contains most of the audio and modulator equipment. The bottom chassis includes the h-v (high-voltage) power supply and overload relay; it is called the power supply section. The three chassis are assembled in a sheet steel cabinet with a front panel upon which the external controls and metering instruments are mounted (fig. 2). The transmitter is bolted to the cradle frame shock mounting base which is anchored to the floor with wrench nuts. The weight is approximately 400 pounds.

b. Provision is made on the top of the transmitter cabinet for mounting Antenna Tuning Unit BC-939-B under four wing nuts. The top panel of Radio Transmitter BC-610-I has two doors which provide quick and easy removal and replacement of the r-f coil and tuning units. Tuning charts, which show the approximate control settings for the transmitter tuning units and r-f coil units, are located in a pocket on the front panel of the transmitter. The top panel has an entry hole to allow use of a cable which feeds the r-f output of a frequency shift exciter to the crystal socket in any one of the tuning units when RTT transmission is desired.

c. The transmitter requires 115-volts, 50-to 60-cycle, a-c power. This power is brought from the power source and is connected to the a-c power plug located at the rear of the modulator deck. Audio input to the modulator section, and also the keying connection for cw, is connected to the transmitter through plug SO5 which is also located at the rear of the modulator deck. All tubes are accessible from the rear of the transmitter chassis after the rear panel is removed. The r-f output terminals are located on the side panel of the transmitter chassis. Socket SO10, which is located below the r-f output terminals, is the r-f output connector to Antenna Tuning Unit BC-939-B. It is used when required to match antennas (such as whips) other than half-waves. The removable back cover has an entry hole to allow use of a control cable.

8. Description of Minor Components

Cord CD-763 is used to connect the transmitter power input socket to the a-c power source. This two-conductor, rubber-covered cord is designed for heavy duty usage.

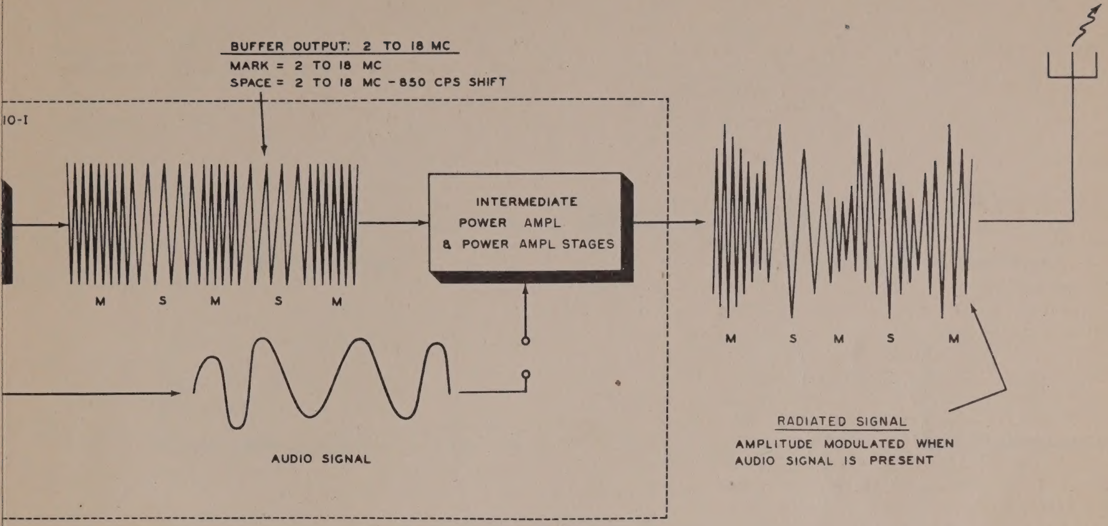
9. Running Spares

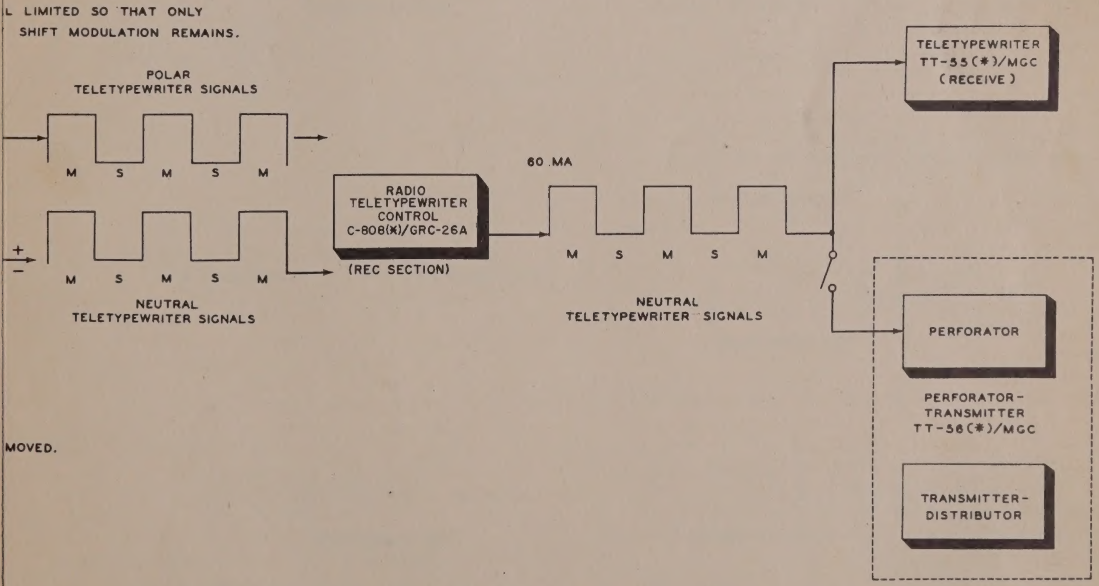
A group of running spares is supplied with each Radio Transmitter BC-610-I. Spares are provided for all normally expendable items such as tubes, pilot lamps, and fuses. The following is a list of running spares as provided with Radio Sets AN/GRC-26A and AN/MRC-2B.

1 Capacitor, vacuum 55 uuf(micromicrofarad), -5 uuf +2 uuf
1 Chart set, calibration
1 Coil Unit C-387-D (2 to 3.5 mc)
1 Coil Unit C-388-C (3.5 to 4.5 mc)
1 Coil Unit C-389-C (4.5 to 5.7 mc)
1 Coil Unit C-390-C (5.7 to 8.0 mc)
1 Coil Unit C-447-B (8.0 to 11.0 mc)
1 Coil Unit C-448-B (11.0 to 14.0 mc)
1 Coil Unit C-449-B (14.0 to 18.0 mc)
6 Fuse FU-50, cartridge, 3 amperes, 250 volts, 3AG
6 Fuse, cartridge, 6 amperes, 250 volts, 3AG
6 Fuse, plug type, 20 amperes, 125 volts, screw base
1 Lamp LM-27, .25 amperes, 6 to 8 volts
2 Lamp, 6 watts, 120 volts, candelabra screw base
2 Transmitter Tuning Unit TU-47 (2.0 to 2.5 mc)
2 Transmitter Tuning Unit TU-48 (2.5 to 3.2 mc)
2 Transmitter Tuning Unit TU-49 (3.2 to 4.0 mc)
2 Transmitter Tuning Unit TU-50 (4.0 to 5.0 mc)
2 Transmitter Tuning Unit TU-51 (5.0 to 6.35 mc)
2 Transmitter Tuning Unit TU-52 (6.35 to 8.0 mc)
2 Transmitter Tuning Unit TU-53 (8.0 to 12.0 mc)
2 Transmitter Tuning Unit TU-54 (12.0 to 18.0 mc)
1 Tube, OD3
2 Tube, 2A3
2 Tube, 3B28
2 Tube, 5Z3
1 Tube, 6L6Y
1 Tube, 6V6Y
2 Tube, 807
2 Tube, 100TH
1 Tube, 250TH

10. Additional Equipment Required

The additional equipment required for operation of Radio Transmitter BC-610-I is dependent upon the type of service which the transmitter is required to perform. In all types of installations, it is necessary to have an a-c power supply of 110 to 115 volts, 2,000 watts minimum, and an antenna system. The antenna should be a doublet in fixed station operation; although a long wire antenna may be used. Table XI shows the tuning ranges for long wire antennas when Antenna Tuning Unit BC-939-(*) is used. For c-w operation, a telegraph key must be provided. The transmitter is keyed between pins 2 and 8 of socket SO5. Normally, when used as part of a system, the transmitter is keyed at a plug connection on Speech Amplifier BC-614-(*). This speech amplifier, or its equivalent, must be provided for voice modulation. A-c power for the speech am-


BUFFER OUTPUT: 2 TO 18 MC
MARK = 2 TO 18 MC
SPACE = 2 TO 18 MC - 850 CPS SHIFT
10-I
M S M S M
INTERMEDIATE POWER AMPL & POWER AMPL STAGES
AUDIO SIGNAL
M S M S M
RADIATED SIGNAL
AMPLITUDE MODULATED WHEN AUDIO SIGNAL IS PRESENT


L LIMITED SO THAT ONLY
SHIFT MODULATION REMAINS.
POLAR TELETYPEWRITER SIGNALS
M S M S M
+
−
M S M S M
NEUTRAL TELETYPEWRITER SIGNALS
RADIO TELETYPEWRITER CONTROL C-808(*)/GRC-26A
(REC SECTION)
60 MA
M S M S M
NEUTRAL TELETYPEWRITER SIGNALS
TELETYPEWRITER TT-55(*)/MGC (RECEIVE)
PERFORATOR
PERFORATOR-TRANSMITTER TT-56(*)/MGC
TRANSMITTER-DISTRIBUTOR
MOVED.

TM828-54

6. Packaging Data

Packaging data relevant to Radio Transmitter BC-610-I is contained in the respective over-all system manual of Radio Sets SCR-399-B, SCR-499-B, AN/MRC-2(*), or AN/GRC-26(*). For information concerning the packaging of this transmitter in any of the above listed systems, refer to the appropriate technical manual. The transmitter normally is not packaged separately when used as part of the above systems; it is bolted to the deck of the transmitting shelter and the connecting cables are installed.

7. Description of Transmitter

a. The transmitter assembly is made up of three chassis (fig. 6). The top chassis (fig. 7) is referred to as the r-f section and includes all of the r-f components. The center section is called the modulator section since it contains most of the audio and modulator equipment. The bottom chassis includes the h-v (high-voltage) power supply and overload relay; it is called the power supply section. The three chassis are assembled in a sheet steel cabinet with a front panel upon which the external controls and metering instruments are mounted (fig. 2). The transmitter is bolted to the cradle frame shock mounting base which is anchored to the floor with wrench nuts. The weight is approximately 400 pounds.

b. Provision is made on the top of the transmitter cabinet for mounting Antenna Tuning Unit BC-939-B under four wing nuts. The top panel of Radio Transmitter BC-610-I has two doors which provide quick and easy removal and replacement of the r-f coil and tuning units. Tuning charts, which show the approximate control settings for the transmitter tuning units and r-f coil units, are located in a pocket on the front panel of the transmitter. The top panel has an entry hole to allow use of a cable which feeds the r-f output of a frequency shift exciter to the crystal socket in any one of the tuning units when RTT transmission is desired.

c. The transmitter requires 115-volts, 50-to 60-cycle, a-c power. This power is brought from the power source and is connected to the a-c power plug located at the rear of the modulator deck. Audio input to the modulator section, and also the keying connection for cw, is connected to the transmitter through plug SO5 which is also located at the rear of the modulator deck. All tubes are accessible from the rear of the transmitter chassis after the rear panel is removed. The r-f output terminals are located on the side panel of the transmitter chassis. Socket SO10, which is located below the r-f output terminals, is the r-f output connector to Antenna Tuning Unit BC-939-B. It is used when required to match antennas (such as whips) other than half-waves. The removable back cover has an entry hole to allow use of a control cable.

8. Description of Minor Components

Cord CD-763 is used to connect the transmitter power input socket to the a-c power source. This two-conductor, rubber-covered cord is designed for heavy duty usage.

9. Running Spares

A group of running spares is supplied with each Radio Transmitter BC-610-I. Spares are provided for all normally expendable items such as tubes, pilot lamps, and fuses. The following is a list of running spares as provided with Radio Sets AN/GRC-26A and AN/MRC-2B.

1 Capacitor, vacuum 55 uuf (micromicrofarad), -5 uuf +2 uuf
1 Chart set, calibration
1 Coil Unit C-387-D (2 to 3.5 mc)
1 Coil Unit C-388-C (3.5 to 4.5 mc)
1 Coil Unit C-389-C (4.5 to 5.7 mc)
1 Coil Unit C-390-C (5.7 to 8.0 mc)
1 Coil Unit C-447-B (8.0 to 11.0 mc)
1 Coil Unit C-448-B (11.0 to 14.0 mc)
1 Coil Unit C-449-B (14.0 to 18.0 mc)
6 Fuse FU-50, cartridge, 3 amperes, 250 volts, 3AG
6 Fuse, cartridge, 6 amperes, 250 volts, 3AG
6 Fuse, plug type, 20 amperes, 125 volts, screw base
1 Lamp LM-27, .25 amperes, 6 to 8 volts
2 Lamp, 6 watts, 120 volts, candelabra screw base
2 Transmitter Tuning Unit TU-47 (2.0 to 2.5 mc)
2 Transmitter Tuning Unit TU-48 (2.5 to 3.2 mc)
2 Transmitter Tuning Unit TU-49 (3.2 to 4.0 mc)
2 Transmitter Tuning Unit TU-50 (4.0 to 5.0 mc)
2 Transmitter Tuning Unit TU-51 (5.0 to 6.35 mc)
2 Transmitter Tuning Unit TU-52 (6.35 to 8.0 mc)
2 Transmitter Tuning Unit TU-53 (8.0 to 12.0 mc)
2 Transmitter Tuning Unit TU-54 (12.0 to 18.0 mc)
1 Tube, OD3
2 Tube, 2A3
2 Tube, 3B28
2 Tube, 5Z3
1 Tube, 6L6Y
1 Tube, 6V6Y
2 Tube, 807
2 Tube, 100TH
1 Tube, 250TH

10. Additional Equipment Required

The additional equipment required for operation of Radio Transmitter BC-610-I is dependent upon the type of service which the transmitter is required to perform. In all types of installations, it is necessary to have an a-c power supply of 110 to 115 volts, 2,000 watts minimum, and an antenna system. The antenna should be a doublet in fixed station operation; although a long wire antenna may be used. Table XI shows the tuning ranges for long wire antennas when Antenna Tuning Unit BC-939-(*) is used. For c-w operation, a telegraph key must be provided. The transmitter is keyed between pins 2 and 8 of socket SO5. Normally, when used as part of a system, the transmitter is keyed at a plug connection on Speech Amplifier BC-614-(*). This speech amplifier, or its equivalent, must be provided for voice modulation. A-c power for the speech am-

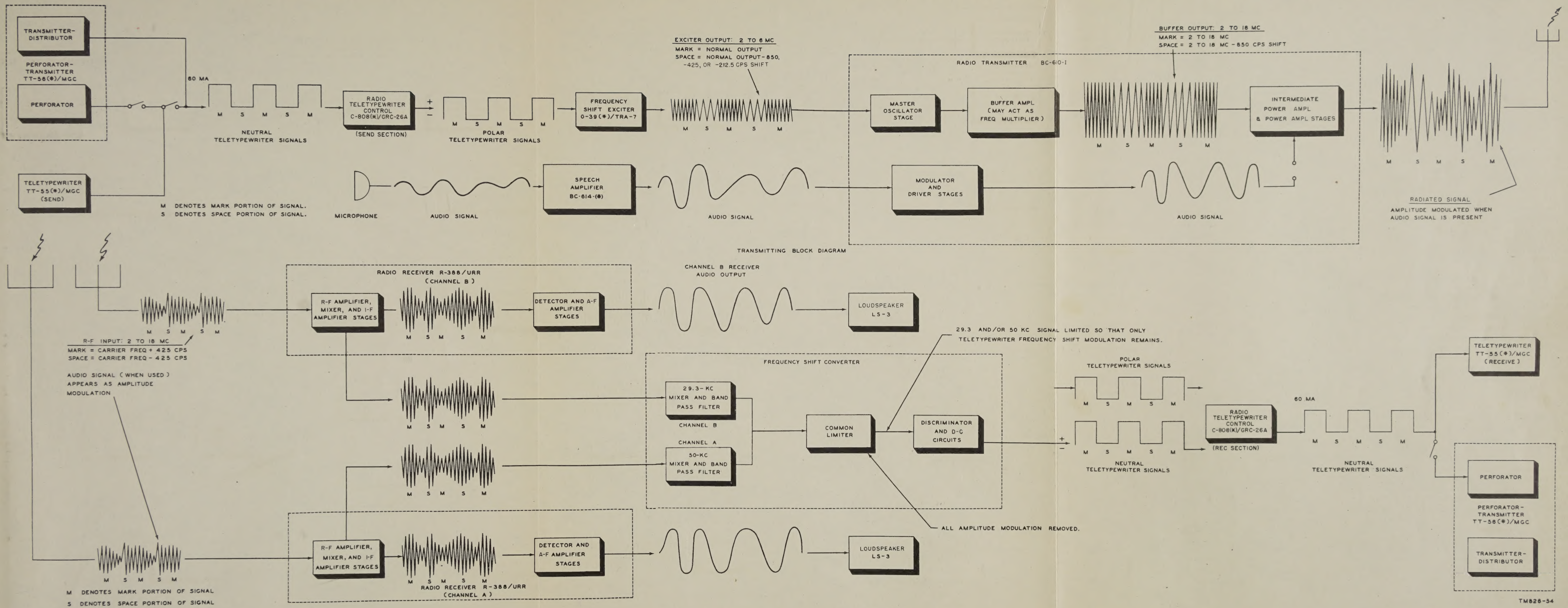

TRANSMITTER-DISTRIBUTOR
PERFORATOR-TRANSMITTER TT-56(*)/MGC
PERFORATOR
60 MA
M S M S M
NEUTRAL TELETYPEWRITER SIGNALS
RADIO TELETYPEWRITER CONTROL C-808(*)/GRC-26A
(SEND SECTION)
+
−
M S M S M
POLAR TELETYPEWRITER SIGNALS
FREQUENCY SHIFT EXCITER O-39(*)/TRA-7
EXCITER OUTPUT: 2 TO 6 MC
MARK = NORMAL OUTPUT
SPACE = NORMAL OUTPUT-850, -425, OR -212.5 CPS SHIFT
M S M S M
RADIO TRANSMITTER BC-610-I
MASTER OSCILLATOR STAGE
BUFFER AMPL (MAY ACT AS FREQ MULTIPLIER)
BUFFER OUTPUT: 2 TO 18 MC
MARK = 2 TO 18 MC
SPACE = 2 TO 18 MC - 850 CPS SHIFT
M S M S M
INTERMEDIATE POWER AMPL & POWER AMPL STAGES
M S M S M
TELETYPEWRITER TT-55(*)/MGC (SEND)
M DENOTES MARK PORTION OF SIGNAL.
S DENOTES SPACE PORTION OF SIGNAL.
MICROPHONE
AUDIO SIGNAL
SPEECH AMPLIFIER BC-614-(*)
AUDIO SIGNAL
MODULATOR AND DRIVER STAGES
AUDIO SIGNAL
RADIATED SIGNAL
AMPLITUDE MODULATED WHEN AUDIO SIGNAL IS PRESENT
TRANSMITTING BLOCK DIAGRAM
RADIO RECEIVER R-388/URR (CHANNEL B)
M S M S M
R-F INPUT: 2 TO 18 MC
MARK = CARRIER FREQ + 425 CPS
SPACE = CARRIER FREQ - 425 CPS
AUDIO SIGNAL (WHEN USED) APPEARS AS AMPLITUDE MODULATION
R-F AMPLIFIER, MIXER, AND I-F AMPLIFIER STAGES
M S M S M
DETECTOR AND A-F AMPLIFIER STAGES
CHANNEL B RECEIVER AUDIO OUTPUT
LOUDSPEAKER LS-3
29.3 AND/OR 50 KC SIGNAL LIMITED SO THAT ONLY TELETYPEWRITER FREQUENCY SHIFT MODULATION REMAINS.
FREQUENCY SHIFT CONVERTER
M S M S M
29.3-KC MIXER AND BAND PASS FILTER
CHANNEL B
CHANNEL A
50-KC MIXER AND BAND PASS FILTER
M S M S M
COMMON LIMITER
DISCRIMINATOR AND D-C CIRCUITS
POLAR TELETYPEWRITER SIGNALS
M S M S M
+
−
M S M S M
NEUTRAL TELETYPEWRITER SIGNALS
RADIO TELETYPEWRITER CONTROL C-808(*)/GRC-26A
(REC SECTION)
60 MA
M S M S M
NEUTRAL TELETYPEWRITER SIGNALS
TELETYPEWRITER TT-55(*)/MGC (RECEIVE)
PERFORATOR
PERFORATOR-TRANSMITTER TT-56(*)/MGC
TRANSMITTER-DISTRIBUTOR
ALL AMPLITUDE MODULATION REMOVED.
M S M S M
R-F AMPLIFIER, MIXER, AND I-F AMPLIFIER STAGES
M S M S M
DETECTOR AND A-F AMPLIFIER STAGES
LOUDSPEAKER LS-3
RADIO RECEIVER R-388/URR (CHANNEL A)
M DENOTES MARK PORTION OF SIGNAL
S DENOTES SPACE PORTION OF SIGNAL
TM826-54

Figure 5. Block diagram of Radio Set AN/GRC-26A.

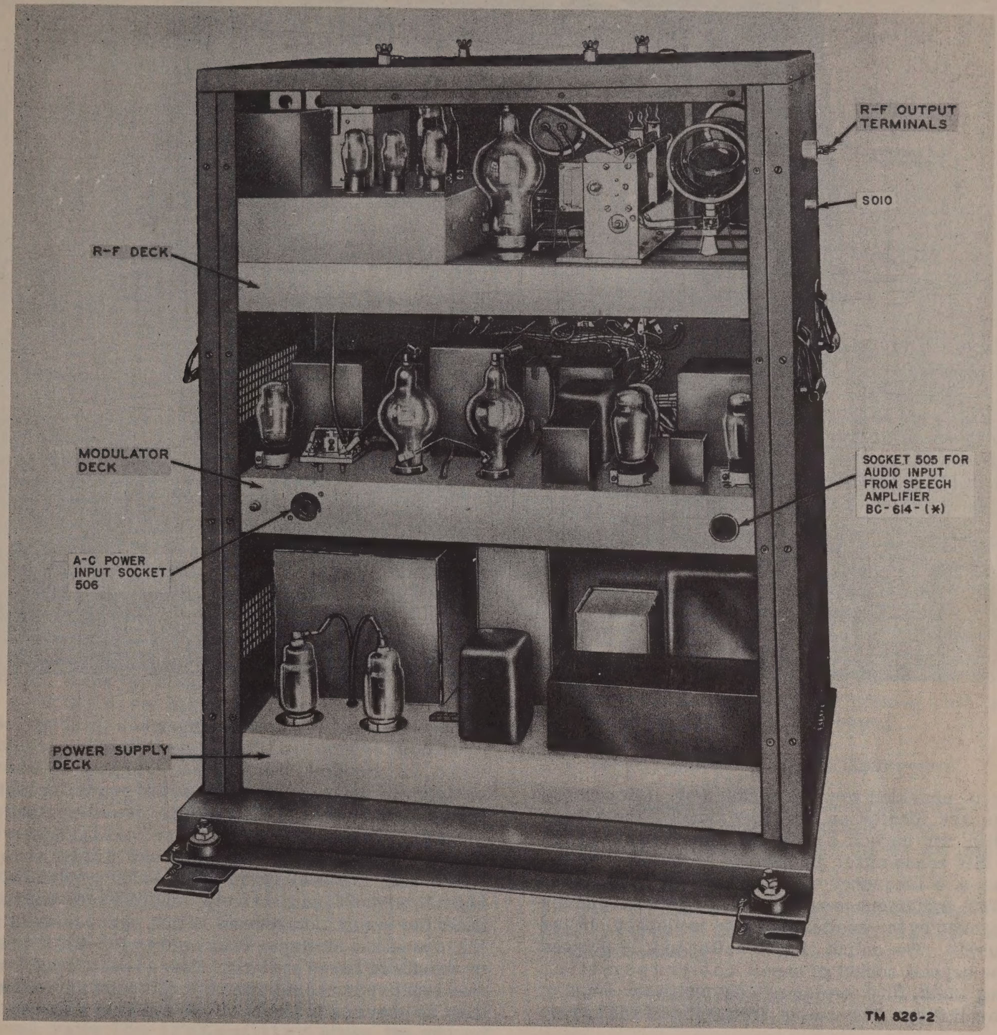

R-F OUTPUT TERMINALS
S010
R-F DECK
MODULATOR DECK
SOCKET 505 FOR AUDIO INPUT FROM SPEECH AMPLIFIER BC-614-(*)
A-C POWER INPUT SOCKET 506
POWER SUPPLY DECK
TM 826-2

Figure 6. Radio Transmitter BC-610-I, rear view.

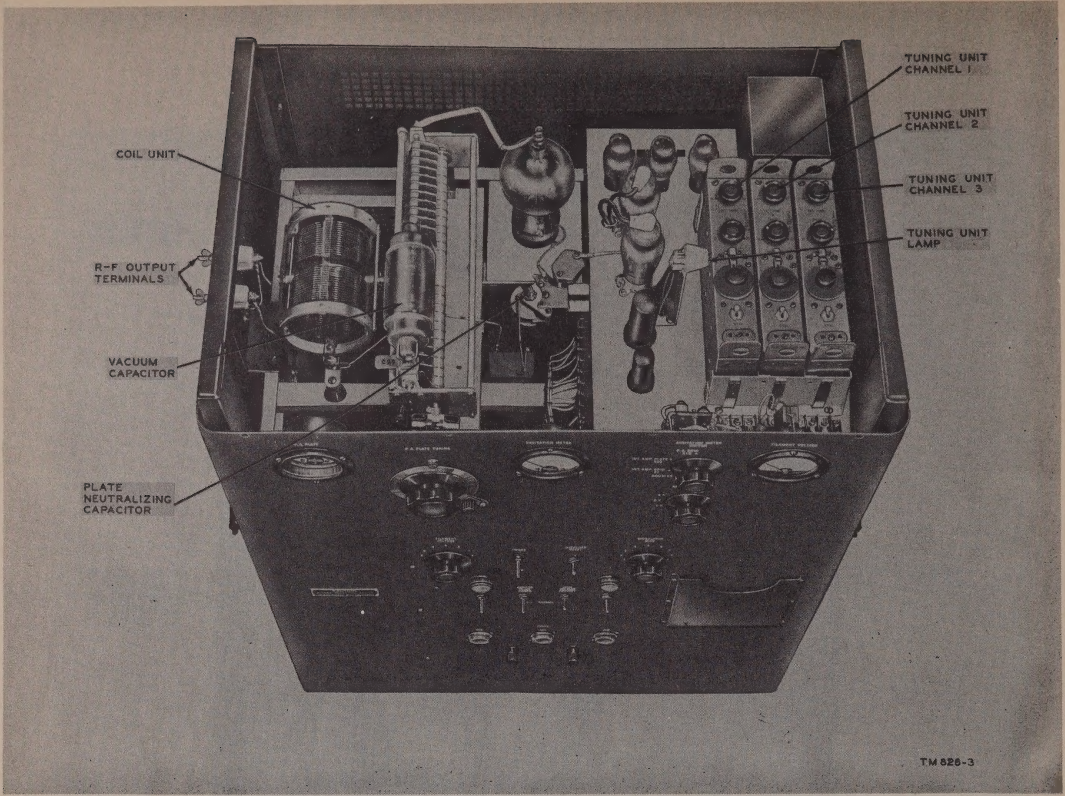

TUNING UNIT CHANNEL 1
TUNING UNIT CHANNEL 2
COIL UNIT
TUNING UNIT CHANNEL 3
TUNING UNIT LAMP
R-F OUTPUT TERMINALS
VACUUM CAPACITOR
PLATE NEUTRALIZING CAPACITOR
TM 826-3

Figure 7. Radio Transmitter BC-610-I with top removed; top view of exciter deck.

plifier is provided through socket SO5. Microphone sockets are located on the front panel of the speech amplifier for carbon or dynamic microphones. When this transmitter is used to transmit RTT intelligence, a frequency shift exciter unit and associated RTT equipment is necessary. The RTT signals are changed by the exciter unit into frequency shifted r-f signals. The output of the exciter unit is plugged into the crystal socket of one of the transmitter tuning units, thus replacing the oscillator stage of the transmitter. The output frequency of the transmitter will then correspond to the output frequency of the exciter unit, which, in turn, is determined by the TT (or facsimile) intelligence being conveyed. Figures 3, 4, and 5 show the block diagrams of Radio Sets SCR-399-B and SCR-499-B, AN/MRC-2, and AN/GRC-26, respectively. These block diagrams show the major components which are required for the operation of Radio Transmitter BC-610-I in any of the above listed systems. More specific information relative to the additional equipment required may be obtained in the over-all systems manuals.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF RADIO TRANSMITTER BC-610-I

11. Siting

a. EXTERNAL REQUIREMENTS. The best location for radio equipment depends on the tactical situation and local conditions, such as the following: need to house the equipment where its shelter cannot be seen; type of housing available; possible installation in a vehicle; terrain; and need of easy access to messengers. Signals from Radio Transmitter BC-610-I have a greater range if the antenna is high and clear from hills, buildings, cliffs, densely wooded areas, and other obstructions. Depressions, valleys, and other low places are poor locations for radio transmission because the surrounding high terrain absorbs r-f energy. Weak or otherwise undesirable signals may be expected if the set is operated under or close to steel bridges, underpasses, or power lines. Choose, if possible, a location on a hilltop or elevation. Flat ground is desirable. Normally, transmission over water is better than over land. See that drainage is adequate to prevent flooding the interior of the shelter. In locating the antenna, avoid obstructions which are 2° or 3° above the horizontal plane of the antenna in the direction of desired transmission. This is approximately 200 to 300 feet at a distance of 1 mile from the antenna. If the doublet or long-wire antenna is used, its directional characteristics should be considered. Every precaution should be taken to protect the transmitter from rain and dirt when it is set up in the open. If the installation is made on bare ground, raise the transmitter above the ground and block it on wooden skids or planks to keep the base dry.

b. INTERIOR REQUIREMENTS. The shelter for the equipment must meet the following requirements:

(1) The floor must be capable of sustaining the weight of the equipment in a level position without vibration.

(2) Sufficient space must be available to permit access to the rear of the transmitter and to allow the removal of the back panels.

(3) Adequate lighting for day and night operation must be provided. Position the transmitter so that the panel designations may be read easily by the operating personnel.

12. Uncrating, Unpacking, and Checking New Equipment

a. GENERAL. Equipment may be shipped in oversea packing cases. When the equipment is received, select a location where the equipment may be unpacked without exposure to the elements and which is convenient to the permanent installation of the equipment.

NOTE. Be careful in uncrating, unpacking, and handling the equipment; it is easily damaged. If it becomes damaged or exposed, a complete overhaul might be required or the equipment might be rendered useless.

b. STEP-BY-STEP INSTRUCTIONS FOR UNCRATING AND UNPACKING EXPORT SHIPMENTS. (1) Place the packing case as near the operating position as convenient.

(2) Cut and fold back the steel straps.

(3) Remove the nails with a nail puller. Remove the top and sides of the packing case. Do not attempt to pry off the sides and top or the equipment may be damaged.

(4) Remove the waterproof or moistureproof barrier, pads of corrugated fiberboard, and all cellulose wadding.

(5) Remove the nuts and bolts which hold the transmitter to the skid.

(6) Remove the skid.

(7) Inspect the equipment for possible damage incurred during shipment.

(8) Check the contents of the packing case against the master packing slip.

NOTE. Save the original packing cases. They can be used again when the equipment is repacked for storage or shipment to base maintenance repair shops.

13. Installation

a. Locate the transmitter according to the requirements of paragraph 11.

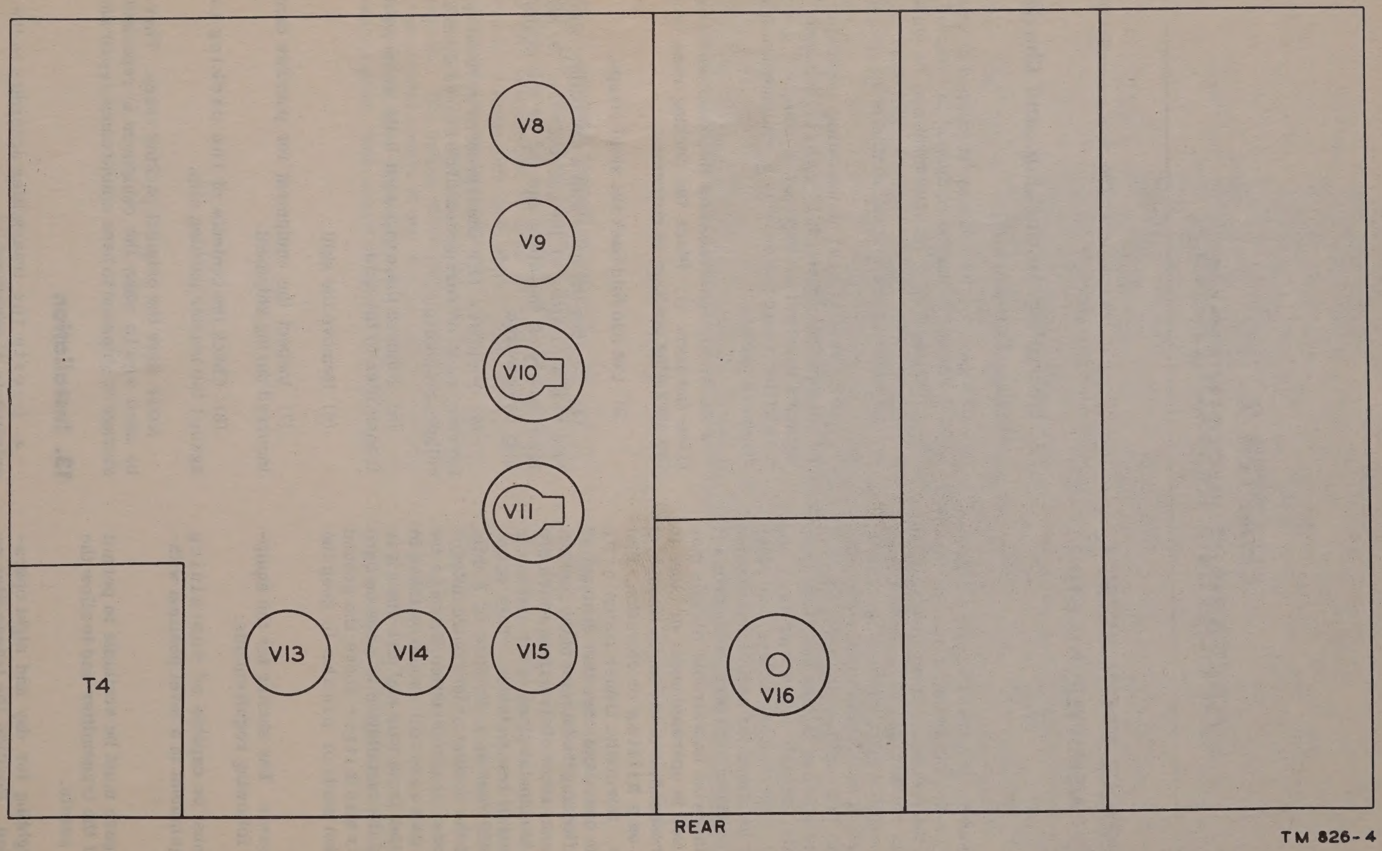
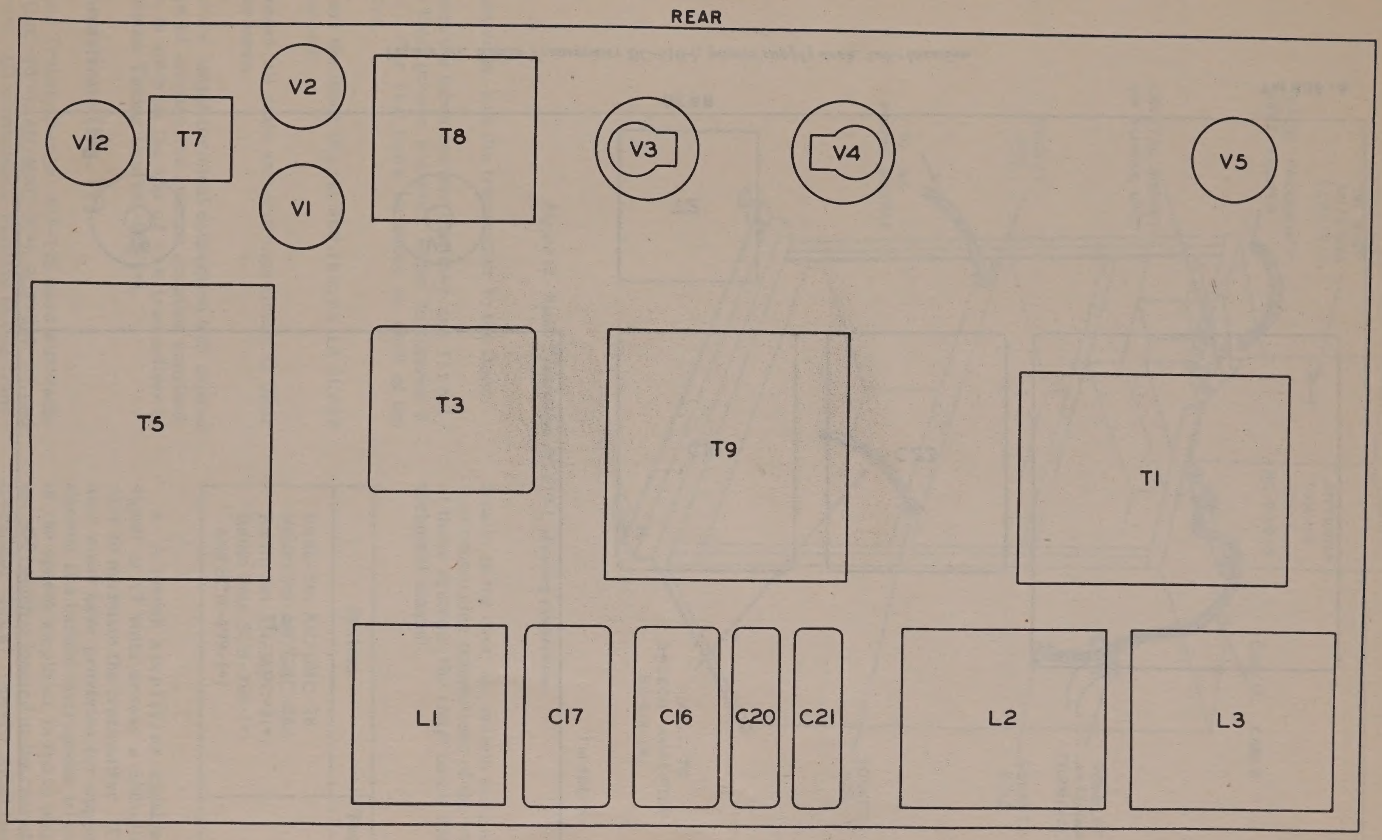

V8
V9
V10
V11
T4
V13
V14
V15
V16
REAR
TM 826-4

Figure 8. Radio Transmitter BC-610-I, exciter (r-f) deck, tube location.


REAR
V12
T7
V2
V1
T8
V3
V4
V5
T5
T3
T9
T1
L1
C17
C16
C20
C21
L2
L3

TM 826-5

Figure 9. Radio Transmitter BC-610-I, modulator deck, tube location.

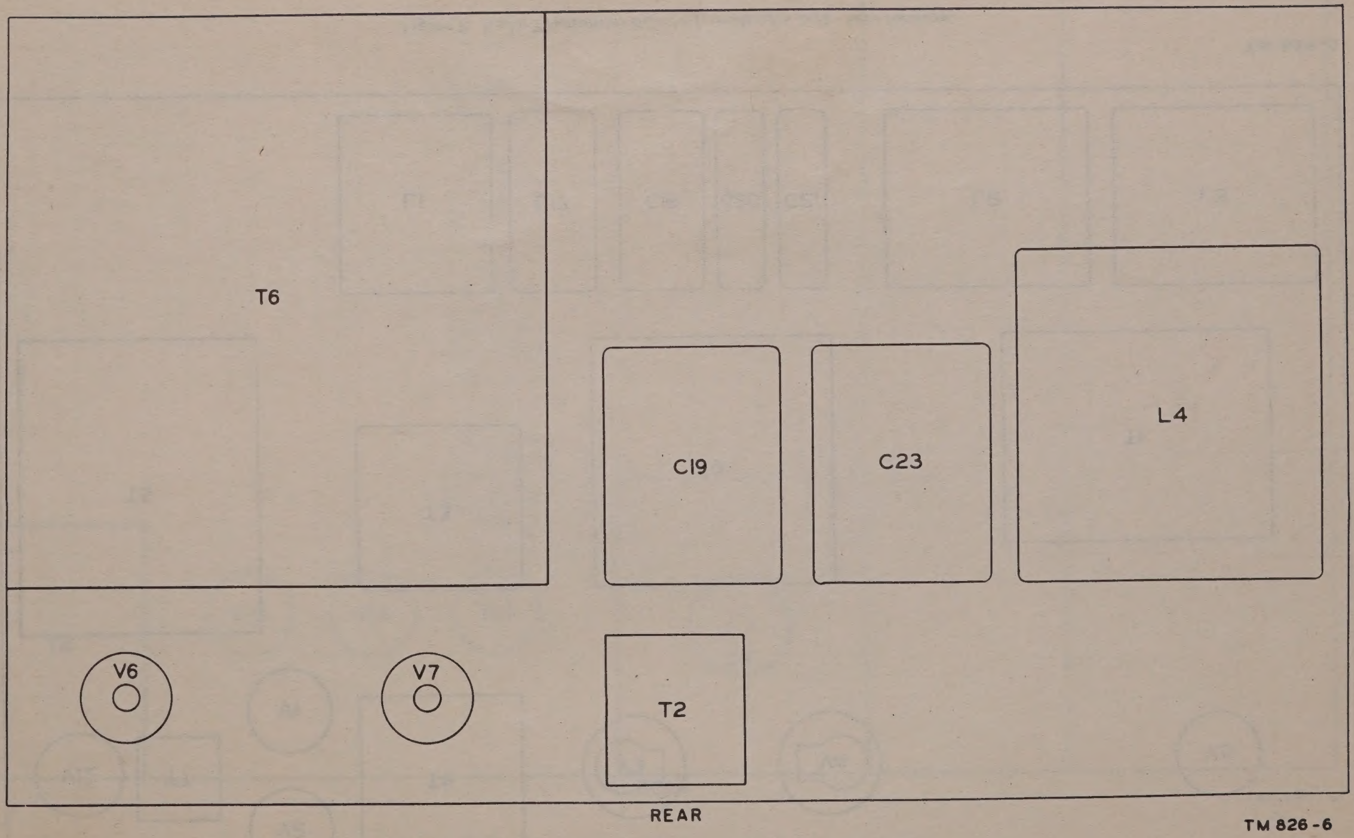

T6
C19
C23
L4
V6
V7
T2
REAR
TM 826-6

Figure 10. Radio Transmitter BC-610-I, power supply deck, tube location.

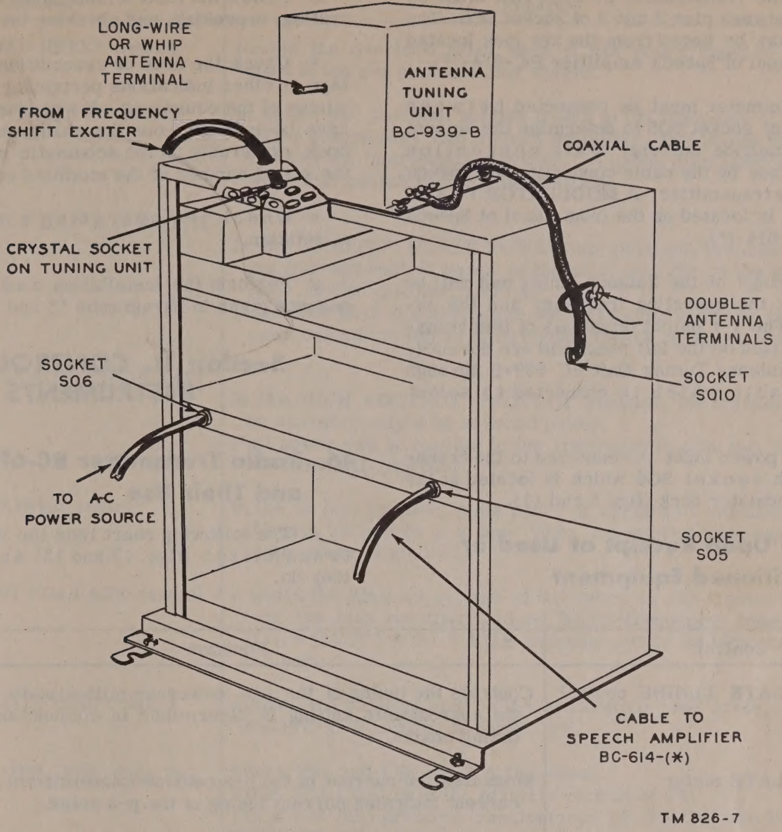

LONG-WIRE
OR WHIP
ANTENNA
TERMINAL
FROM FREQUENCY
SHIFT EXCITER
ANTENNA
TUNING
UNIT
BC-939-B
COAXIAL CABLE
CRYSTAL SOCKET
ON TUNING UNIT
DOUBLET
ANTENNA
TERMINALS
SOCKET
SO6
SOCKET
SO10
TO A-C
POWER SOURCE
SOCKET
SO5
CABLE TO
SPEECH AMPLIFIER
BC-614-(*)
TM 826-7

Figure 11. Radio Transmitter BC-610-1, showing connections.

b. If possible, bolt the transmitter to the floor.

c. Insert the tubes and see that they are firmly seated in their proper sockets. Refer to figures 8, 9, and 10 for the tube locations on each of the three decks.

d. Insert the fuses (fig. 1) and lamps in their proper sockets.

e. Connect all plate and grid caps firmly to their respective tubes.

f. The r-f output terminal connection will depend on the type of antenna and antenna coupling supplied. Provision is made on the top of the transmitter to mount Antenna Tuning Unit BC-939-(*).

14. Connections (fig. 11)

a. Radio Transmitter BC-610-I is used with Radio Sets AN/GRC-26(*), AN/MRC-2(*), SCR-399-(*), and SCR-499-(*). All connections, relative to this transmitter in any of these systems, are covered specifically in the over-all system manual. For information concerning connections of the transmitter in any of these systems, the chart below lists the applicable technical manual.

System	Technical Manual
Radio Set AN/GRC-26	TM 11-264
Radio Set AN/GRC-26A	TM 11-264A
Radio Set AN/MRC-2(*)	TM 11-624
Radio Sets SCR-399-(*) and SCR-499-(*)	TM 11-281

b. A speech amplifier capable of delivering a signal of 17 volts across a 500-ohm load is necessary to modulate the transmitter. The amplifier also must have provision for supplying microphone current if a carbon microphone is used. The output of the speech amplifier is fed to pins 6 and 7 of socket SO5 (which is located at the rear of the transmitter modulator deck). Speech Amplifier BC-614-I normally is used with Radio Transmitter BC-610-I.

c. To key the transmitter, provision must be made to key between pins 2 and 8 of socket SO5. The transmitter may be keyed from the key jack located on the front panel of Speech Amplifier BC-614-(*).

d. A milliammeter must be connected between pins 5 and 8 of socket SO5 to determine the amount of modulator cathode current. This connection normally is made by the cable connecting the speech amplifier to the transmitter. A MODULATOR PLATE current meter is located on the front panel of Speech Amplifier BC-614-(*).

e. The settings of the antenna tuning unit will be determined by the operating frequency and the antenna used. The r-f output terminals of this transmitter are located on the left panel and are normally connected to Antenna Tuning Unit BC-939-B through a coaxial cable which is connected to socket SO10 (fig. 11).

f. The a-c power input is connected to the transmitter through socket SO6 which is located at the rear of the modulator deck (figs 6 and 11).

15. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 12 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note the change in this instruction book, preferably on the schematic diagram. Include the serial number of the modified equipment.

c. Check the operating controls for ease of rotation.

d. Perform the installation and connection procedures given in paragraphs 13 and 14.

Section II. CONTROLS AND INSTRUMENTS

16. Radio Transmitter BC-610-I Controls and Their Use

a. The following chart lists the controls of the transmitter (figs. 12 and 13) and indicates what they do.

Control	Function
P.A. PLATE TUNING control	Controls the tuning of the p-a (power-amplifier) plate circuit. Its approximate setting is determined in conjunction with the tuning charts.
P.A. PLATE meter	Measures the current in the p-a cathode (plate) circuit; minimum current indicates correct tuning of the p-a stage.
EXCITATION METER	Indicates the degree of resonance in the doubler plate circuit, the i-p-a (intermediate-power-amplifier) grid or plate circuits, or the p-a grid circuit, depending upon the position of the EXCITATION METER SWITCH.
FILAMENT VOLTAGE meter	Indicates the p-a filament voltage, which is determined by the setting of the FILAMENT VOLTAGE control.
EXCITATION METER SWITCH	Has four positions: P.A. GRID X10. EXCITATION METER indicates p-a grid current. INT. AMP. PLATE X20. EXCITATION METER indicates i-p-a plate current. INT. AMP. GRID X1. EXCITATION METER indicates i-p-a current. DOUBLER PLATE X10. EXCITATION METER indicates buffer-doubler plate current.
BAND SWITCH	Has three positions to connect any one of the three transmitter tuning units (figs. 7 and 13) into the transmitter circuits.
PHONE-C.W. switch	In C.W. position, full power is applied to the pa and the modulator is taken out of the transmitter circuit. In PHONE position, reduced power is applied to the pa and the modulator is connected in the transmitter circuit.

Control	Function
OVERLOAD RESET switch	Resets the overload relay when it has been tripped by an overload in the p-a or modulator stages.
FILAMENT POWER switch	In the on (up) position, applies power to the filaments of all tubes in the transmitter and speech amplifier, and to the plate circuits of the bias supply rectifier. A green pilot lamp is lighted when this switch is in the on position.
EXCITER PLATE POWER switch	In the EXCITER PLATE POWER (up) position, grounds the keying line and applies power to the plate circuits of the r-f oscillator, buffer-doubler, and ipa. In the NORMAL position, plate power is removed from these circuits unless the key or microphone switch is depressed.
HIGH VOLTAGE PROTECT switch	In the HIGH VOLTAGE PROTECT position, the transmitter can be operated only with reduced power. Full power can be applied to the transmitter with this switch in the NORMAL position.
PLATE POWER switch	In the on (up) position, plate power is applied to modulator tubes V3 and V4 and to p-a tube V16. A red pilot lamp lights when plate power is applied.
FILAMENT VOLTAGE control	Adjusts the filament voltage of all tubes in the transmitter except the bias rectifier and a-f (audio-frequency) drivers. The FILAMENT VOLTAGE reading should be between 5.0 and 5.3 volts.
MODULATOR BIAS control	Adjusts the value of bias on the modulation tube grids, when the PHONE-C.W. switch is on PHONE.
FUSES, FS1, FS2, FS3, FS4, and FS5	Fuses FS1 and FS2 are 25A line fuses. FUSE FS3 (20A) is in the primary circuit of T6. FUSE FS4 (6A) protects transformers T2, T3, T4, and T5. FUSE FS5 (3A) protects transformer T1, and T101 in the speech-amplifier power supply.

b. The following chart lists the controls of the transmitter tuning units (fig. 13):

Control	Function
M.O.-XTAL (crystal) switch	Controls the type of operation: M.O. position for master oscillator control, XTAL position for crystal control.
M.O. (master oscillator)	Determines the frequency of the master oscillator. Calibrations on the dial allow presetting to values obtained from the tuning chart.
DOUB. control	Tunes the buffer-doubler tank circuit to resonance with the first, second, or fourth harmonic of the signal from the oscillator. Approximate settings for this control can be found on the tuning chart.
INT. AMP. control	Tunes the i-p-a tank circuit to resonance with the signal from the buffer-doubler. Approximate settings for this control can be found on the tuning chart.
Crystal holder	Holds Crystal Holder FT-171-B.

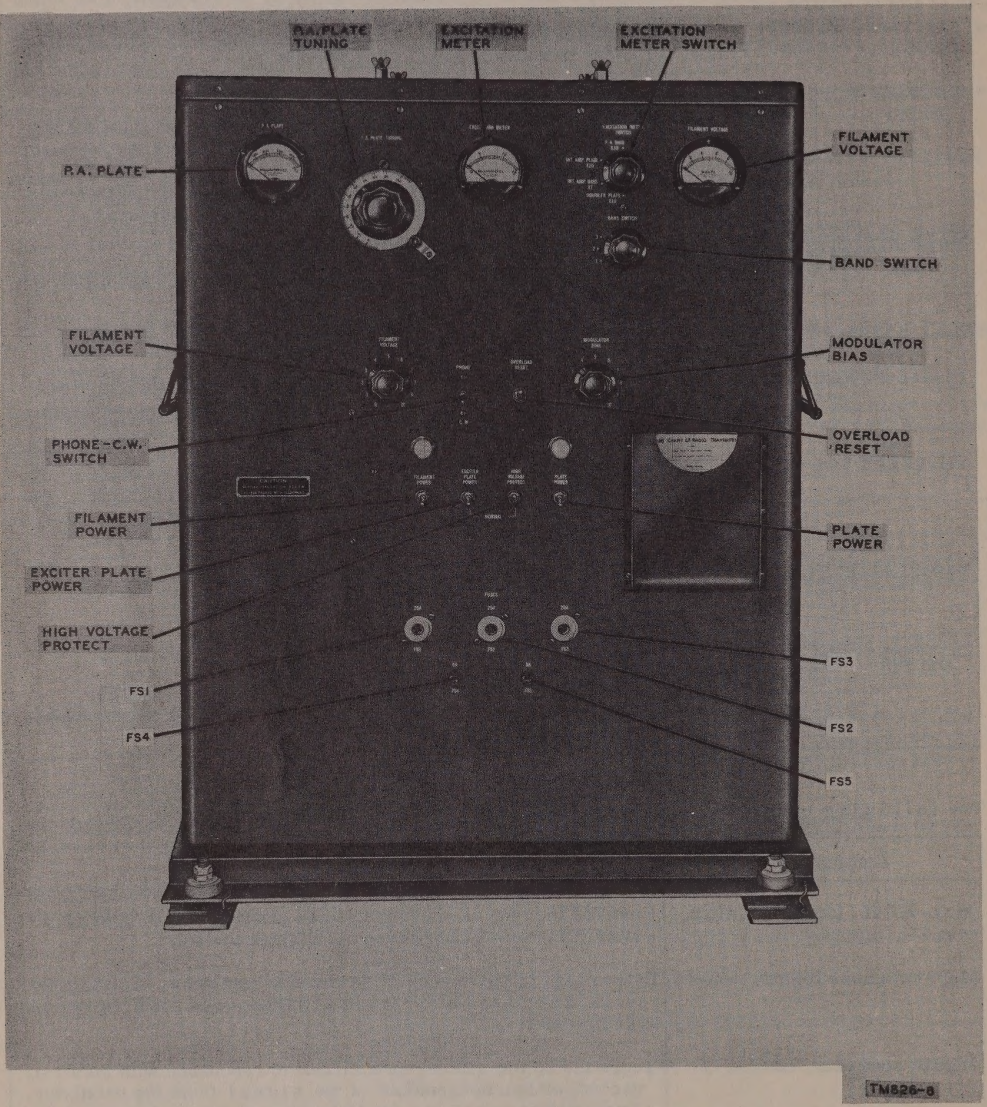
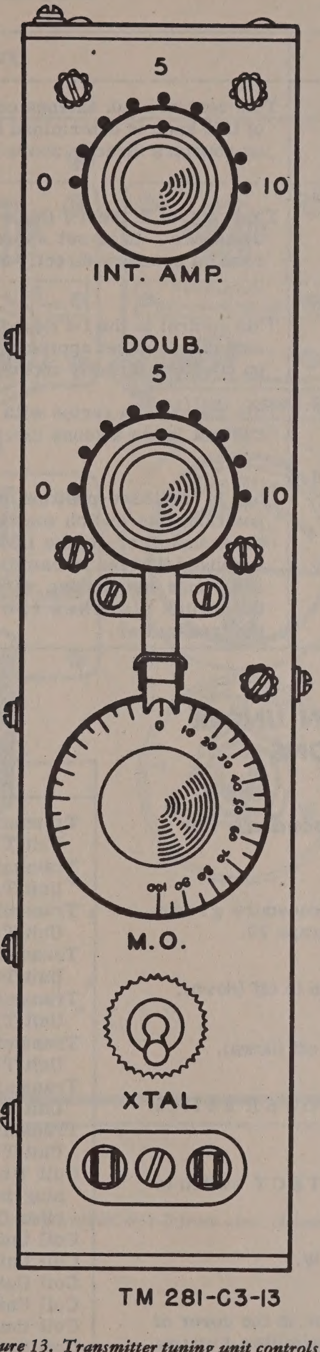

P.A. PLATE TUNING
EXCITATION METER
EXCITATION METER SWITCH
P.A. PLATE
FILAMENT VOLTAGE
BAND SWITCH
FILAMENT VOLTAGE
MODULATOR BIAS
PHONE-C.W. SWITCH
OVERLOAD RESET
FILAMENT POWER
PLATE POWER
EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
FS3
FS1
FS2
FS4
FS5
TM826-8

Figure 12. Transmitter front view, showing controls.


5
0
10
INT. AMP.
DOUB.
5
0
10
0
10
20
30
40
50
60
70
80
90
100
M.O.
XTAL

TM 281-C3-13

Figure 13. Transmitter tuning unit controls.

17. Antenna Tuning Unit BC-939-B Controls and Their Uses

The following chart lists the controls of the antenna tuning unit (fig. 14) and indicates what they do:

Control	Function
COUPLING INCREASE	This control is an antenna coupling adjustment knob. The setting of this knob is determined from the tuning charts and is read on counters directly above the knob.
18 MC-FREQUENCY INCREASE-10 MC	This control is the h-f (high-frequency) tuning adjustment for the antenna. It is set approximately by the tuning charts and is read on counters directly above the control.
10 MC-FREQUENCY INCREASE-2 MC	This control is the l-f (low-frequency) tuning adjustment for the antenna. It is set approximately by the tuning charts and is read on counters directly above the control.
ANTENNA CURRENT meter	This meter is in series with the antenna and measures the r-f current in the antenna circuit.
2-10 MC-LONG WIRE-10-18 MC	This is the three-position antenna range switch. In the 2-10 MC position, this switch matches a whip antenna to the l-f range of the transmitter. In the LONG WIRE position, the antenna is so arranged that the transmitter will work on any frequency within its range into a long wire antenna. In the 10-18 MC position, the switch matches the whip antenna to the h-f range of the transmitter.

Section III. OPERATION UNDER USUAL CONDITIONS

18. Preliminary Starting Procedure for M-o, C-w Operation

Perform the preliminary starting procedure given below before proceeding as in paragraph 20.

a. Set FILAMENT POWER switch to off (down).

b. Set PLATE POWER switch to off (down).

c. Set EXCITER PLATE POWER switch to NORMAL.

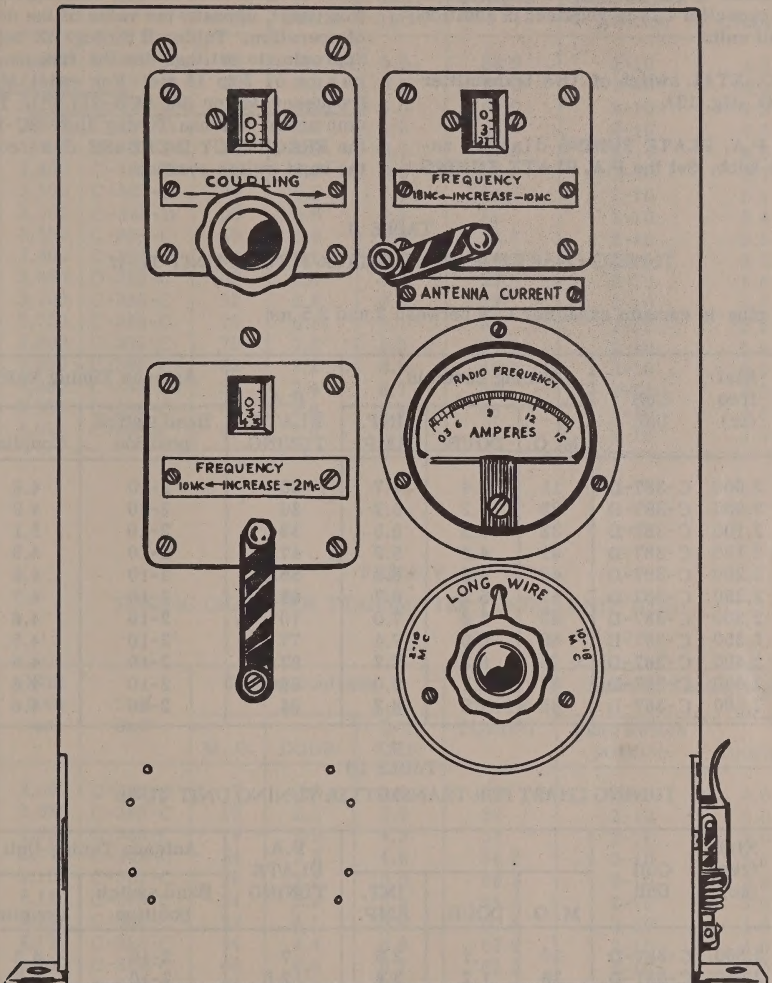
d. Set HIGH VOLTAGE PROTECT switch to HIGH VOLTAGE PROTECT.

e. Set PHONE-C.W. switch to C.W.

f. Open the right-hand door in the cover of the transmitter and insert the transmitter tuning unit covering the desired frequency (table I) in channel 1 (fig. 7).

TABLE I
TUNING COMPONENTS

Component	Frequency range (mc)
Transmitter Tuning Unit TU-47	2.0 to 2.5
Transmitter Tuning Unit TU-48	2.5 to 3.2
Transmitter Tuning Unit TU-49	3.2 to 4.0
Transmitter Tuning Unit TU-50	4.0 to 5.0
Transmitter Tuning Unit TU-51	5.0 to 6.35
Transmitter Tuning Unit TU-52	6.35 to 8.0
Transmitter Tuning Unit TU-53	8.0 to 12.0
Transmitter Tuning Unit TU-54	12.0 to 18.0
Coil Unit C-387-D (with plug-in vacuum capacitor C28)	2.0 to 2.5
Coil Unit C-387-D	2.5 to 3.5
Coil Unit C-388-C	3.5 to 4.5
Coil Unit C-389-C	4.5 to 5.7
Coil Unit C-390-C	5.7 to 8.0
Coil Unit C-447-B	8.0 to 11.0
Coil Unit C-448-B	11.0 to 14.0
Coil Unit C-449-B	14.0 to 18.0


COUPLING
FREQUENCY
18MC←INCREASE—10MC
ANTENNA CURRENT
RADIO FREQUENCY
AMPERES
0 3 6 9 12 15
FREQUENCY
10MC←INCREASE—2Mc
LONG WIRE
2-10 MC
10-18 MC

TM 826-51

Figure 14. Antenna Tuning Unit BC-939-B front view, showing controls.

g. Set the BAND SWITCH to position 1.

h. Open the left-hand door in the cover of the transmitter and insert the coil unit (fig. 7) covering the desired frequency (table I). Make sure that the coupling coil inside the coil unit is in a horizontal position. If operation in the 2.0- to 2.5-mc range is desired, vacuum capacitor C28 is required in addition to the correct coil unit.

i. Set the M.O.-XTAL switch of the transmitter tuning unit to M.O. (fig. 13).

j. Unlock the P.A. PLATE TUNING dial by unscrewing the lock knob. Set the P.A. PLATE TUNING according to the calibration charts; or use tables II through IX below.

k. Set the remaining controls (INT. AMP., DOUB., and the m-o tuning dial) on the tuning unit to their proper positions. The numerical values of the positions of these controls are obtained from the calibration chart, opposite the value of the desired frequency of operation. Tables II through IX below indicate the approximate settings for the frequencies used in the range of 2 to 18 mc. For exact M.O. setting, use Frequency Meter Set SCR-211-(*). The loading column under Antenna Tuning Unit BC-939-B refers to the FREQUENCY INCREASE dial corresponding to the band switch position.

TABLE II

TUNING CHART FOR TRANSMITTER TUNING UNIT TU-47

NOTE. Use plug-in vacuum capacitor C28 between 2 and 2.5 mc.

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
2,000	2,000	C-387-D	11	2.4	4.7	20	2-10	4.9	4.6
2,050	2,050	C-387-D	22	3.2	5.2	30	2-10	4.9	7.1
2,100	2,100	C-387-D	32	3.8	5.5	39	2-10	5.1	9.4
2,150	2,150	C-387-D	41	4.3	5.9	47.5	2-10	4.9	11.4
2,200	2,200	C-387-D	49	4.8	6.3	56.5	2-10	4.8	13.3
2,250	2,250	C-387-D	57	5.2	6.7	63.5	2-10	4.7	15.1
2,300	2,300	C-387-D	63	5.6	7.0	70	2-10	4.6	16.8
2,350	2,350	C-387-D	69	6.0	7.4	77	2-10	4.5	18.3
2,400	2,400	C-387-D	75	6.3	7.7	83	2-10	4.5	19.8
2,450	2,450	C-387-D	81	6.7	8.0	88	2-10	4.6	21.3
2,500	2,500	C-387-D	85	7.0	8.2	94	2-10	4.6	22.6

TABLE III

TUNING CHART FOR TRANSMITTER TUNING UNIT TU-48

Operating freq (kc)	Xtal freq (kc)	Coil Unit				P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
2,500	2,500	C-387-D	10	.7	2.8	7	2-10	4.3	22.6
2,550	2,550	C-387-D	18	1.7	3.4	12.5	2-10	4.3	23.9
2,600	2,600	C-387-D	26	2.4	3.9	17	2-10	4.3	25.0
2,650	2,650	C-387-D	33	3.1	4.4	21.5	2-10	4.2	26.2
2,700	2,700	C-387-D	40	3.7	4.9	25.5	2-10	4.2	27.3
2,750	2,750	C-387-D	46	4.1	5.3	29.0	2-10	4.2	28.3
2,800	2,800	C-387-D	52	4.5	5.8	33.0	2-10	4.2	29.3
2,850	2,850	C-387-D	58	4.9	6.1	36.5	2-10	4.2	30.2
2,900	2,900	C-387-D	63	5.2	6.5	40.5	2-10	4.5	31.0
2,950	2,950	C-387-D	68	5.6	6.8	43.5	2-10	4.1	32.0
3,000	3,000	C-387-D	73	5.9	7.2	47.0	2-10	4.1	32.7
3,050	3,050	C-387-D	78	6.1	7.4	50.0	2-10	4.1	33.5
3,100	3,100	C-387-D	82	6.4	7.7	53.0	2-10	4.1	34.2
3,150	3,150	C-387-D	87	6.6	7.9	55.5	2-10	4.2	35.0
3,200	3,200	C-387-D	90	6.8	8.0	58.5	2-10	4.2	35.6

TABLE IV
TUNING CHART FOR TRANSMITTER TUNING UNIT TU-49

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P. A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
3,200	3,200	C-387-D	25	3.4	5.8	58.5	2-10	4.2	35.6
3,250	3,250	C-387-D	30	3.8	6.1	61.0	2-10	4.3	36.3
3,300	3,300	C-387-D	35	4.2	6.3	63.0	2-10	4.3	37.0
3,350	3,350	C-387-D	40	4.6	6.5	65.5	2-10	4.5	37.5
3,400	3,400	C-387-D	45	4.9	6.7	67.0	2-10	4.6	38.2
3,450	3,450	C-387-D	50	5.3	6.9	69.5	2-10	4.7	38.7
3,500	3,500	C-387-D	55	5.6	7.1	71.5	2-10	5.1	39.3
3,500	3,500	C-388-D	55	5.6	7.1	21	2-10	3.4	38.9
3,550	3,550	C-388-C	59	5.9	7.3	23.5	2-10	3.5	39.5
3,600	3,600	C-388-C	64	6.1	7.5	26.5	2-10	3.5	39.9
3,650	3,650	C-388-C	68	6.4	7.7	29.5	2-10	3.6	40.4
3,700	3,700	C-388-C	72	6.6	7.9	32	2-10	3.7	40.9
3,750	3,750	C-388-C	75	6.8	8.1	35	2-10	3.8	41.3
3,800	3,800	C-388-C	79	7.0	8.3	37.5	2-10	3.9	41.7
3,850	3,850	C-388-C	82	7.2	8.5	40.5	2-10	3.9	42.2
3,900	3,900	C-388-C	85	7.4	8.7	43	2-10	4.0	42.5
3,950	3,950	C-388-C	88	7.6	8.8	45	2-10	4.0	42.9
4,000	4,000	C-388-C	91	7.8	8.9	48	2-10	4.0	43.2

TABLE V
TUNING CHART FOR TRANSMITTER TUNING UNIT TU-50

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
4,000	2,000	C-388-C	7	2.2	3.5	48	2-10	4.0	43.2
4,050	2,025	C-388-C	13	2.5	3.9	50	2-10	4.0	43.7
3,100	2,050	C-388-C	19	2.9	4.3	52	2-10	4.0	44.0
2,150	2,075	C-388-C	24	3.2	4.6	54.5	2-10	3.9	44.3
4,200	2,100	C-388-C	29	3.5	5.0	56.5	2-10	3.9	44.6
4,250	2,125	C-388-C	34	3.8	5.3	58.5	2-10	3.9	44.9
4,300	2,150	C-388-C	39	4.1	5.6	60.5	2-10	4.0	45.2
4,350	2,175	C-388-C	44	4.4	5.9	62.5	2-10	4.0	45.5
4,400	2,200	C-388-C	48	4.6	6.1	63.5	2-10	4.0	45.8
4,450	2,225	C-388-C	52	4.8	6.4	65.5	2-10	4.0	46.1
4,500	2,250	C-388-C	56	5.1	6.6	67	2-10	4.0	46.3
4,500	2,250	C-389-C	56	5.1	6.6	12.5	2-10	2.8	46.2
4,550	2,275	C-389-C	60	5.3	6.8	15	2-10	2.8	46.4
4,600	2,300	C-389-C	64	5.6	7.0	17.5	2-10	2.9	46.7
4,650	2,325	C-389-C	67	5.8	7.2	20	2-10	2.9	46.9
4,700	2,350	C-389-C	71	6.0	7.3	22	2-10	2.8	47.2
4,750	2,375	C-389-C	74	6.2	7.5	24.5	2-10	2.9	47.4
4,800	2,400	C-389-C	78	6.4	7.7	26.5	2-10	2.9	47.6
4,850	2,425	C-389-C	81	6.6	7.8	29	2-10	2.9	47.9
4,900	2,450	C-389-C	84	6.8	8.0	31	2-10	2.9	48.1
4,950	2,475	C-389-C	88	7.0	8.2	33	2-10	2.8	48.3
5,000	2,500	C-389-C	91	7.1	8.4	34.5	2-10	2.8	48.5

TABLE VI
TUNING CHART FOR TRANSMITTER TUNING UNIT TU-51

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
5,000	2,500	C-389-C	5	2.5	4.0	35.5	2-10	2.8	48.5
5,050	2,525	C-389-C	10	2.8	4.3	37.5	2-10	2.8	48.7
5,100	2,550	C-389-C	15	3.1	4.6	39.5	2-10	2.8	48.9
5,150	2,575	C-389-C	19	3.4	4.8	41.5	2-10	2.8	49.1
5,200	2,600	C-389-C	23	3.7	5.1	43	2-10	2.8	49.3
5,250	2,625	C-389-C	27	3.9	5.3	45	2-10	2.8	49.5
5,300	2,650	C-389-C	31	4.2	5.6	47	2-10	2.8	49.6
5,350	2,675	C-389-C	34	4.4	5.8	48.5	2-10	2.8	49.8
5,400	2,700	C-389-C	38	4.6	6.0	50.5	2-10	2.8	50.0
5,450	2,725	C-389-C	41	4.8	6.2	52	2-10	2.8	50.1
5,500	2,750	C-389-C	44	5.0	6.4	54	2-10	2.8	50.4
5,550	2,775	C-389-C	48	5.2	6.6	55.5	2-10	2.8	50.5
5,600	2,800	C-389-C	51	5.4	6.7	57	2-10	2.8	50.7
5,650	2,825	C-389-C	55	5.5	6.9	58.5	2-10	2.8	50.9
5,700	2,850	C-389-C	58	5.7	7.1	60	2-10	2.8	51.0
5,700	2,850	C-390-C	58	5.7	7.1	21	2-10	2.2	50.9
5,750	2,875	C-390-C	61	5.9	7.2	23	2-10	2.2	51.0
5,800	2,900	C-390-C	64	6.1	7.4	25	2-10	2.3	51.2
5,850	2,925	C-390-C	66	6.2	7.5	26.5	2-10	2.2	51.3
5,900	2,950	C-390-C	69	6.4	7.7	28.5	2-10	2.2	51.4
5,950	2,975	C-390-C	72	6.5	7.8	29.5	2-10	2.3	51.5
6,000	3,000	C-390-C	74	6.7	8.0	31.5	2-10	2.3	51.7
6,050	3,025	C-390-C	77	6.8	8.1	33.5	2-10	2.3	51.9
6,100	3,050	C-390-C	79	7.0	8.2	35	2-10	2.3	51.9
6,150	3,075	C-390-C	82	7.1	8.4	36.5	2-10	2.3	52.0
6,200	3,100	C-390-C	84	7.2	8.5	38.5	2-10	2.3	52.2
6,250	3,125	C-390-C	87	7.3	8.7	40	2-10	2.3	52.3
6,300	3,150	C-390-C	89	7.5	8.8	41.5	2-10	2.3	52.5
6,350	3,175	C-390-C	90	7.5	8.9	43.5	2-10	2.3	52.5

TABLE VII
TUNING CHART FOR TRANSMITTER TUNING UNIT TU-52

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
6,350	3,175	C-390-C	8	4.4	2.8	43.5	2-10	2.3	52.5
6,400	3,200	C-390-C	10	4.6	3.3	45	2-10	2.2	52.7
6,500	3,250	C-390-C	17	5.0	3.8	47.5	2-10	2.2	53.0
6,600	3,300	C-390-C	23	5.4	4.2	50.5	2-10	2.2	53.1
6,700	3,350	C-390-C	29	5.8	4.7	53	2-10	2.2	53.4
6,800	3,400	C-390-C	35	6.1	5.1	55	2-10	2.2	53.6
6,900	3,450	C-390-C	41	6.4	5.6	58	2-10	2.2	53.7
7,000	3,500	C-390-C	47	6.6	6.0	60.5	2-10	2.2	54.0
7,100	3,550	C-390-C	52	6.9	6.4	63	2-10	2.2	54.2
7,200	3,600	C-390-C	57	7.1	6.8	65	2-10	2.2	54.4
7,300	3,650	C-390-C	62	7.3	7.1	67	2-10	2.2	54.5
7,400	3,700	C-390-C	67	7.5	7.4	69	2-10	2.2	54.7
7,500	3,750	C-390-C	71	7.7	7.7	71	2-10	2.2	54.9
7,600	3,800	C-390-C	75	7.9	8.0	72.5	2-10	2.2	55.1
7,700	3,850	C-390-C	79	8.1	8.2	74.5	2-10	2.2	55.2
7,800	3,900	C-390-C	83	8.3	8.4	76	2-10	2.2	55.4
7,900	3,950	C-390-C	87	8.4	8.6	77.5	2-10	2.2	55.5
8,000	4,000	C-390-C	91	8.5	8.8	78.5	2-10	2.2	55.7

TABLE VIII

TUNING CHART FOR TRANSMITTER TUNING UNIT TU-53

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
8,000	4,000	C-447-B	6	1.5	1.5	20.5	2-10	1.5	55.5
8,100	4,050	C-447-B	9	1.8	1.8	23.5	2-10	1.5	55.7
8,200	4,100	C-447-B	13	2.0	2.0	26	2-10	1.5	55.9
8,300	4,150	C-447-B	16	2.3	2.3	28.5	2-10	1.5	56.1
8,400	4,200	C-447-B	19	2.6	2.6	31	2-10	1.5	56.1
8,500	4,250	C-447-B	23	2.8	2.8	33.5	2-10	1.5	56.2
8,600	4,300	C-447-B	26	3.1	3.1	36	2-10	1.5	56.4
8,700	4,350	C-447-B	29	3.3	3.3	38.5	2-10	1.5	56.5
8,800	4,400	C-447-B	32	3.6	3.6	41	2-10	1.5	56.7
8,900	4,450	C-447-B	35	3.8	3.8	43	2-10	1.5	56.8
9,000	4,500	C-447-B	38	4.0	4.0	45.5	2-10	1.5	57.1
9,100	4,550	C-447-B	41	4.2	4.2	47.5	2-10	1.5	57.3
9,200	4,600	C-447-B	43	4.3	4.3	49.5	2-10	1.5	57.4
9,300	4,650	C-447-B	46	4.5	4.5	52	2-10	1.5	57.5
9,400	4,700	C-447-B	49	4.7	4.7	53.5	2-10	1.5	57.7
9,500	4,750	C-447-B	51	4.9	4.9	55.5	2-10	1.5	57.7
9,600	4,800	C-447-B	53	5.1	5.1	57.5	2-10	1.5	57.8
9,700	4,850	C-447-B	55	5.3	5.3	59	2-10	1.5	58.0
9,800	4,900	C-447-B	57	5.4	5.4	60.5	2-10	1.4	58.3
9,900	4,950	C-447-B	59	5.6	5.6	63	2-10	1.4	58.4
10,000	5,000	C-447-B	61	5.7	5.7	64.5	2-10	1.4	58.5
10,000	5,000	C-447-B	61	5.7	5.7	64.5	10-18	1.1	[a]2.5
10,100	5,050	C-447-B	63	5.8	5.8	65.5	10-18	1.1	[a]2.7
10,200	5,100	C-447-B	65	6.0	6.0	67	10-18	1.1	[a]3.0
10,300	5,150	C-447-B	67	6.2	6.2	68.5	10-18	1.1	[a]3.4
10,400	5,200	C-447-B	68	6.3	6.3	70	10-18	1.1	[a]3.7
10,500	5,250	C-447-B	70	6.4	6.4	71.5	10-18	1.1	[a]4.0
10,600	5,300	C-447-B	72	6.6	6.6	72.5	10-18	1.1	[a]4.5
10,700	5,350	C-447-B	73	6.7	6.7	74	10-18	1.1	[a]4.7
10,800	5,400	C-447-B	75	6.8	6.8	75	10-18	1.1	[a]5.0
10,900	5,450	C-447-B	76	7.0	7.0	76.5	10-18	1.1	[a]5.3
11,000	5,500	C-447-B	78	7.1	7.1	77.5	10-18	1.1	[a]5.7
11,000	5,500	C-448-B	78	7.1	7.1	37	10-18	1.2	[a]5.6
11,100	5,550	C-448-B	79	7.2	7.2	39	10-18	1.2	[a]5.8
11,200	5,600	C-448-B	81	7.3	7.3	40.5	10-18	1.2	[a]6.1
11,300	5,650	C-448-B	82	7.4	7.4	42.5	10-18	1.2	[a]6.5
11,400	5,700	C-448-B	83	7.5	7.5	44.5	10-18	1.2	[a]6.7
11,500	5,750	C-448-B	84	7.6	7.6	46	10-18	1.2	[a]7.0
11,600	5,800	C-448-B	85	7.7	7.7	48	10-18	1.2	[a]7.1
11,700	5,850	C-448-B	86	7.8	7.8	49.5	10-18	1.2	[a]7.4
11,800	5,900	C-448-B	87	7.9	7.9	51	10-18	1.2	[a]7.7
11,900	5,950	C-448-B	88	8.0	8.0	52.5	10-18	1.2	[a]7.9
12,000	6,000	C-448-B	90	8.1	8.1	54.5	10-18	1.2	[a]8.1

[a] Set 10 MC-FREQUENCY INCREASE-2 MC loading coil dial at 30.

TABLE IX
TUNING CHART FOR TRANSMITTER TUNING UNIT TU-54

Operating freq (kc)	Xtal freq (kc)	Coil Unit	Tuning controls			P.A. PLATE TUNING	Antenna Tuning Unit BC-939-B		
			M. O.	DOUB.	INT. AMP.		Band switch position	Coupling	Loading
12,000	3,000	C-448-B	6	.3	1.1	54.5	10-18	1.2	[a]8.1
12,100	3,025	C-448-B	9	.4	1.4	55.5	10-18	1.2	[a]8.4
12,200	3,050	C-448-B	12	.6	1.6	57	10-18	1.1	[a]8.6
12,300	3,075	C-448-B	14	.8	1.8	58.5	10-18	1.1	[a]8.8
12,400	3,100	C-448-B	17	1.0	2.1	60	10-18	1.1	[a]9.0
12,500	3,125	C-448-B	19	1.2	2.3	61	10-18	1.1	[a]9.2
12,600	3,150	C-448-B	21	1.4	2.5	62.5	10-18	1.1	[a]9.5
12,700	3,175	C-448-B	23	1.5	2.7	64	10-18	1.1	[a]9.8
12,800	3,200	C-448-B	25	1.7	2.9	65	10-18	1.1	[a]9.9
12,900	3,225	C-448-B	27	1.8	3.1	66.5	10-18	1.1	[a]10.0
13,000	3,250	C-448-B	29	1.9	3.2	67.5	10-18	1.1	[a]10.3
13,100	3,275	C-448-B	31	2.1	3.3	69	10-18	1.1	[a]10.4
13,200	3,300	C-448-B	33	2.2	3.5	70	10-18	1.1	[a]10.7
13,300	3,325	C-448-B	35	2.4	3.7	71	10-18	1.1	[a]10.8
13,400	3,350	C-448-B	37	2.5	3.8	72	10-18	1.1	[a]11.0
13,500	3,375	C-448-B	38	2.6	4.0	73	10-18	1.1	[a]11.2
13,600	3,400	C-448-B	40	2.7	4.1	74.5	10-18	1.1	[a]11.3
13,700	3,425	C-448-B	41	2.8	4.3	75	10-18	1.1	[a]11.6
13,800	3,450	C-448-B	43	3.0	4.4	76.5	10-18	1.1	[a]11.6
13,900	3,475	C-448-B	45	3.1	4.5	77	10-18	1.0	[a]11.8
14,000	3,500	C-448-B	46	3.2	4.6	78	10-18	1.0	[a]11.9
14,000	3,500	C-449-B	46	3.2	4.6	37.5	10-18	1.1	[a]12.0
14,200	3,550	C-449-B	49	3.4	4.8	40.5	10-18	1.1	[a]12.3
14,400	3,600	C-449-B	52	3.6	5.1	43	10-18	1.1	[a]12.4
14,600	3,650	C-449-B	55	3.8	5.3	46	10-18	1.1	[a]12.8
14,800	3,700	C-449-B	58	3.9	5.5	48.5	10-18	1.1	[a]13.0
15,000	3,750	C-449-B	61	4.1	5.7	52.5	10-18	1.1	[a]13.2
15,200	3,800	C-449-B	63	4.3	5.8	54.5	10-18	1.1	[a]13.6
15,400	3,850	C-449-B	65	4.5	6.1	57	10-18	1.0	[a]13.8
15,600	3,900	C-449-B	68	4.7	6.2	59	10-18	1.0	[a]14.2
15,800	3,950	C-449-B	70	4.8	6.4	61.5	10-18	1.0	[a]14.2
16,000	4,000	C-449-B	72	5.0	6.6	63	10-18	1.0	[a]14.4
16,200	4,050	C-449-B	74	5.2	6.7	65	10-18	1.0	[a]14.6
16,400	4,100	C-449-B	76	5.3	6.8	67	10-18	.9	[a]14.7
16,600	4,150	C-449-B	78	5.5	6.9	69	10-18	.9	[a]14.7
16,800	4,200	C-449-B	80	5.6	7.1	71	10-18	.8	[a]14.9
17,000	4,250	C-449-B	82	5.7	7.2	73	10-18	.8	[a]15.1
17,200	4,300	C-449-B	84	5.8	7.4	75	10-18	.8	[a]15.4
17,400	4,350	C-449-B	85	5.9	7.5	76.5	10-18	.7	[a]15.4
17,600	4,400	C-449-B	87	6.1	7.7	77	10-18	.5	[a]15.6
17,800	4,450	C-449-B	89	6.2	7.9	80	10-18	.4	[a]16.0
18,000	4,500	C-449-B	91	6.3	8.1	82	10-18	.4	[a]16.3

[a] Set 10 MC-FREQUENCY INCREASE-2 MC loading coil dial at 30.

19. Preliminary Starting Procedure for Crystal C-w Operation

a. Perform all operations in paragraph 18a through h.

b. Set the M.O.-XTAL switch of the transmitter tuning unit to XTAL.

c. Insert Crystal Holder FT-171-B, with a crystal of proper frequency as determined by the desired operating frequency and table X, into the crystal jack.

d. Set the INT. AMP. and DOUB. controls on the transmitter tuning unit to their proper position. The numerical values of the positions of these controls are obtained from the calibration charts furnished with the transmitter, or from tables II through IX in this instruction book.

e. At frequencies between 2 and 4 mc, the transmitter output frequency is the same as the crystal frequency, and the circuit controlled by the DOUB. knob functions as a buffer stage. At frequencies between 4 and 12 mc, this stage acts as a doubler; hence the output frequency is twice that of the crystal. For example, a crystal with a frequency of 2,200 kc may be used with Transmitter Tuning Unit TU-47 to produce 2,200 kc in the transmitter output, or it may be used with Transmitter Tuning Unit TU-50 to operate the transmitter on 4,400 kc. At frequencies between 12 and 18 mc, this stage quadruples the crystal frequency. For example, a 4,000 kc crystal will produce a transmitter output frequency of 16,000 kc.

Caution: Radio Transmitter BC-610-I contains extremely high voltages which are dangerous to life if contacted. The protective electrical interlock switches should not be relied upon. A red bull's-eye pilot lamp, labeled PLATE POWER, on the front panel of the transmitter indicates when the h-v supply is turned on. However, since this lamp may burn out, do not rely on it to show that no high voltage is present. When the transmitter is in operation, extremely high r-f voltages are present around the antenna tuning unit. Beware of r-f burns. Make certain that the voltage is off before changing parts and making repairs.

TABLE X
CRYSTALS AND OPERATING FREQUENCIES

NOTE. Radio Sets SCR-399-(*) and SCR-499-(*) include a set of Crystal Holders FT-171-B whose crystals have the frequencies shown in the first column. For convenience, the additional operating frequencies which may be obtained by using different transmitter tuning units are also listed. Two groups of crystals are available, only one of which is supplied with each radio set.

Group I						
Xtal freq (kc)	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit
2,030	2,030	TU-47	4,060	TU-50		
2,045	2,045	TU-47	4,090	TU-50		
2,065	2,065	TU-47	4,130	TU-50		
2,105	2,105	TU-47	4,210	TU-50		
2,105	2,105	TU-47	4,210	TU-50		
2,125	2,125	TU-47	4,250	TU-50		
2,145	2,145	TU-47	4,290	TU-50		
2,155	2,155	TU-47	4,310	TU-50		
2,220	2,220	TU-47	4,440	TU-50		
2,258	2,258	TU-47	4,516	TU-50		
2,260	2,260	TU-47	4,520	TU-50		
2,282.5	2,282.5	TU-47	4,565	TU-50		
2,290	2,290	TU-47	4,580	TU-50		
2,300	2,300	TU-47	4,600	TU-50		
2,305	2,305	TU-47	4,610	TU-50		
2,320	2,320	TU-47	4,640	TU-50		
2,360	2,360	TU-47	4,720	TU-50		
2,390	2,390	TU-47	4,780	TU-50		
2,415	2,415	TU-47	4,830	TU-50		
2,435	2,435	TU-47	4,870	TU-50		
2,442.5	2,442.5	TU-47	4,885	TU-50		
2,532.5	2,532.5	TU-48	5,065	TU-51		
2,545	2,545	TU-48	5,090	TU-51		
2,557.5	2,557.5	TU-48	5,115	TU-51		
3,202.5	3,202.5	TU-49	6,405	TU-52	12,810	TU-54
3,215	3,215	TU-49	6,430	TU-52	12,860	TU-54
3,237.5	3,237.5	TU-49	6,475	TU-52	12,950	TU-54
3,250	3,250	TU-49	6,500	TU-52	13,000	TU-54
3,322.5	3,322.5	TU-49	6,645	TU-52	13,290	TU-54
3,510	3,510	TU-49	7,020	TU-52	14,040	TU-54
3,520	3,520	TU-49	7,040	TU-52	14,080	TU-54
3,550	3,550	TU-49	7,100	TU-52	14,200	TU-54
3,570	3,570	TU-49	7,140	TU-52	14,280	TU-54

TABLE X (contd.)
CRYSTALS AND OPERATING FREQUENCIES

Xtal freq (kc)	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit
Group I						
3,580	3,580	TU-49	7,160	TU-52	14,320	TU-54
3,945	3,945	TU-49	7,890	TU-52	15,780	TU-54
3,955	3,955	TU-49	7.910	TU-52	15,820	TU-54
Group II						
2,030	2,030	TU-47	4,060	TU-50		
2,052.5	2,052.5	TU-47	4,105	TU-50		
2,085	2,085	TU-47	4,170	TU-50		
2,117.5	2,117.5	TU-47	4,235	TU-50		
2,160	2,160	TU-47	4,320	TU-50		
2,200	2,200	TU-47	4,400	TU-50		
2,217.5	2,217.5	TU-47	4,435	TU-50		
2,390	2,390	TU-47	4,780	TU-50		
2,415	2,415	TU-47	4,830	TU-50		
2,436	2,436	TU-47	4,872	TU-50		
2,532.5	2,532.5	TU-48	5,065	TU-51		
2,647.5	2,647.5	TU-48	5,295	TU-51		
2,772	2,772	TU-48	5,544	TU-51		
2,980	2,980	TU-48	5,960	TU-51		
3,000	3,000	TU-48	6,000	TU-51	12,000	TU-54
3,035	3,035	TU-48	6,070	TU-51	12,140	TU-54
3,100	3,100	TU-48	6,200	TU-51	12,400	TU-54
3,120	3,120	TU-48	6,240	TU-51	12,480	TU-54
3,150	3,150	TU-48	6,300	TU-51	12,600	TU-54
3,155	3,155	TU-48	6,310	TU-51	12,620	TU-54
3,232.5	3,232.5	TU-49	6,465	TU-52	12,930	TU-54
3,265	3,265	TU-49	6,530	TU-52	13,060	TU-54
3,322.5	3,322.5	TU-49	6,645	TU-52	13,290	TU-54
3,417.5	3,417.5	TU-49	6,835	TU-52	13,670	TU-54
3,475	3,475	TU-49	6,950	TU-52	13,900	TU-54
3,588	3,588	TU-49	7,176	TU-52	14,352	TU-54
3,665	3,665	TU-49	7,330	TU-52	14,660	TU-54
3,725	3,725	TU-49	7,450	TU-52	14,900	TU-54
3,785	3,785	TU-49	7,570	TU-52	15,140	TU-54
3,792.5	3,792.5	TU-49	7,585	TU-52	15,170	TU-54
3,850	3,850	TU-49	7,700	TU-52	15,400	TU-54
3,865	3,865	TU-49	7,730	TU-52	15,460	TU-54
3,905	3,905	TU-49	7,810	TU-52	15,620	TU-54
3,935	3,935	TU-49	7,870	TU-52	15,740	TU-54
3,995	3,995	TU-49	7,990	TU-52	15,980	TU-54
3,997.5	3,997.5	TU-49	7,995	TU-52	15,990	TU-54

20. Starting Procedure for C-w Operation

NOTE. Always tune the transmitter for c-w operation first.

a. Supply 115-volt 50- to 60-cycle a-c power to socket SO6 located on the rear of the modulator chassis (fig. 11).

b. Set the FILAMENT POWER switch (fig. 12) of the transmitter to on (up). The green pilot lamp should light. The FILAMENT VOLTAGE meter should register. Allow 1 minute for the filament to come up to the proper operating temperature.

c. Adjust the FILAMENT VOLTAGE control of the transmitter until the FILAMENT VOLTAGE meter indicates between 5.0 and 5.3 volts.

d. Set the EXCITATION METER SWITCH on the front panel of the transmitter to INT. AMP. GRID.

e. Set the EXCITER PLATE POWER switch to on (up).

f. Adjust the center knob (DOUB.) of the transmitter tuning unit (figs. 7 and 13) for maximum reading as indicated on the EXCITATION METER.

g. Set the EXCITATION METER SWITCH to P.A. GRID.

h. Adjust the INT. AMP. knob of the transmitter tuning unit for maximum reading as indicated on the EXCITATION METER.

i. Repeat subparagraphs f and h until maximum possible deflection is obtained on the EXCITATION METER. The EXCITATION METER should indicate between 60 and 100 ma (milliamperes).

j. Set the EXCITER PLATE POWER switch to NORMAL (off).

k. Make certain that both doors in the top cover of the transmitter are firmly closed upon the interlock switches; otherwise plate power cannot be applied. Check that an antenna or dummy load is connected to the transmitter.

l. Set the HIGH VOLTAGE PROTECT switch at HIGH VOLTAGE PROTECT. Always do this before tuning the final amplifier.

m. Set the PLATE POWER switch to on. This will operate plate relay RY1 and antenna shorting relay RY4. (This will normally be accomplished during operation by associated equipment which shorts pins 3 and 4 in socket SO5.) The red pilot lamp on the transmitter should light.

n. Set the EXCITER PLATE POWER switch to on (up). This will key the cathode circuit of the master oscillator stage. (This will normally be accomplished during operation by associated equipment shorting pins 2 and 8 on socket SO5.) All subsequent tuning adjustments are made with the circuit keyed. The P.A. PLATE meter should indicate a flow of current in the circuit. The quantity of current will depend upon the setting of the P.A. PLATE TUNING dial and the movable coupling coil in the final tank coil.

o. Rotate the P.A. PLATE TUNING dial until the P.A. PLATE meter dips to a minimum reading.

p. The method of tuning the antenna to the output impedance of the p-a tank circuit will vary depending upon the type of antenna and associated antenna equipment supplied. Adjust the antenna equipment, keeping the P.A. PLATE meter reading at 100 ma. Table XI shows the long-wire antenna lengths required for specific frequency ranges.

q. If the minimum P.A. PLATE meter reading is much below 100 ma, turn off the transmitter, open the left-hand top door, and remove the coil unit. Move the coupling coil to about 15° from horizontal and replace the coil unit. Close the door and apply plate power. Tune the P.A. PLATE TUNING dial for minimum on the P.A. PLATE meter. If the reading is still below 100 ma, add more coupling in the same manner. Do not couple above 100 ma.

TABLE XI.

TUNING RANGES FOR LONG WIRE ANTENNAS WHEN USED WITH ANTENNA TUNING UNIT BC-939-B

Antenna lengths (ft)	Useful frequency range (mc)
25	2 to 10; 15 to 18
35	2 to 6; 11 to 18
45	2 to 4; 10 to 18
65	2 to 3; 9 to 18

r. Set the HIGH VOLTAGE PROTECT switch of the transmitter at NORMAL. Key the transmitter. The P.A. PLATE meter will now indicate a substantially higher reading.

s. Adjust the antenna equipment until maximum antenna current occurs when the P.A. PLATE meter reads 290 ma. If no antenna coupling unit is suppled, then the coupling coil in the final tank coil can be used for adjusting the coupling between the final tank coil and the antenna.

Caution: Never exceed a P.A. plate meter reading of 300 ma on c-w operation. It is permissible to reduce the plate current to as low as 200 ma, if satisfactory c-w communication is still maintained. Readjust the P.A. PLATE TUNING dial for a minimum reading of the P.A. PLATE meter. Keep P.A. GRID current at a maximum, with the DOUB. and INT. AMP. controls.

t. Key the transmitter and check the FILAMENT VOLTAGE meter. If necessary, reset the FILAMENT VOLTAGE knob until this meter reads 5.0 to 5.3 volts; then release the key.

u. This completes the tuning procedure; the transmitter is ready for c-w operation.

21. Starting Procedure for Phone Operation

a. Perform all operations in paragraph 18 to 19 (depending upon whether the operation is to be master oscillator controlled or crystal controlled) and paragraph 20.

b. Set the MODULATOR BIAS control on the transmitter to the extreme counterclockwise position (this increases the bias).

c. Set the PHONE-C.W. switch at PHONE.

Caution: Never throw this switch while the power amplifier is turned on (red lamp lit).

d. Operate plate relay RY1 and antenna shorting relay RY4 (par. 20m). The P.A. PLATE meter should read approximately 250 ma, which is the normal plate current for voice operation. If the transmitter has been tuned to 290 ma on c-w operation, the plate current will be 250 ma when the transmitter is switched to voice because the PHONE-C.W. switch automatically reduces the power amplifier plate voltage. If the P.A. PLATE meter reads more than 260 ma, turn off the plate power and adjust the antenna coupling until the plate current is reduced to the proper value.

e. Adjust the MODULATOR BIAS control on the transmitter for 40 ma of modulator current with no audio input to the transmitter. Modulator current normally is shown by a meter, in associated equipment, that is connected between pins 5 and 8 of socket SO5.

f. The audio signal which is normally supplied by associated equipment to pins 6 and 7 of socket SO5 should cause the modulator current to reach 200 ma at voice peaks.

g. This completes the tuning procedure and the transmitter is ready for voice operation.

22. Stopping Procedure

a. Set EXCITER PLATE POWER switch to NORMAL.

b. Set PLATE POWER switch to off.

c. Set FILAMENT POWER switch to off.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

23. General

The operation of Radio Transmitter BC-610-I may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. Instructions are given in the following paragraphs on procedures for minimizing the effect of these unusual operation conditions.

24. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

a. Handle the equipment carefully.

b. Keep the equipment warm and dry. If the set is not in a heated inclosure, construct an insulated box for the set. Keep oven heaters turned on, provided this does not overtax the power supply.

c. Mercury vapor tubes, which may be used in the associated transmitters, require more time to warm up than other vacuum tubes. Before turning on the plate voltage, turn on the filaments and let the tubes heat until they feel warm to the touch; this may take from 10 to 15 minutes, depending on the temperature of the surrounding air. If the tube is not warm when the plate voltage is turned on, the surge of current due to hv may ruin the tube.

d. Locate the equipment inside a heated inclosure where there is no danger of a cold draft striking the glass tubes when a door is opened. A sudden draft of cold air is often sufficient to shatter the glass envelope of a heated tube. If the inclosure is so constructed that this precaution is impossible, place a blanket or some barrier between the source of the draft and the equipment.

e. When equipment which has been exposed to the cold is brought into a warm room, it will start to sweat and will continue to do so until it reaches room temperature. This condition also arises when equipment warms up during the day after exposure during a cold night. When the equipment has reached room temperature, dry it thoroughly.

25. Operation in Tropical Climates

When operated in tropical climates, radio equipment may be installed in tents, huts, or, when necessary, in underground dugouts. When equipment is installed below ground and when it is set up in swampy areas, moisture conditions are more acute than normal in the tropics. Ventilation is usually very poor, and the high relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the ambient air. To minimize this condition, keep the oven heaters turned on.

26. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. The main problem which arises with equipment operation in desert areas is the large amount of sand or dust and dirt which enters the moving parts of radio equipment. The ideal preventive precaution is to house the equipment in a dustproof shelter. Since, however, such a building is seldom available and would require air conditioning, the next best precaution is to make the building in which the equipment is located as dustproof as possible with available materials. Hang wet sacking over the windows and doors, cover the inside walls heavy paper, and with sand, secure the side walls of tents to prevent their flapping in the wind.

c. Never tie power cords, signal cords, or other wiring connections to either the inside or the outside of tents. Desert areas are subject to sudden wind squalls which may jerk the connections loose or break the lines.

d. Take care to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (par. 32). Pay particular attention to the condition of the lubrication of the equipment. Excessive amounts of dust, sand, or dirt that come into contact with oil and grease result in grit, which will damage the equipment.

Section V. PRESETTING AND FREQUENCY CHANGING

27. Presetting Tuning Units

a. Transmitter tuning units may be tuned one after another for master oscillator controlled operation by following paragraphs 18 and 20a through 20j, or for crystal controlled operation by following paragraphs 19 and 20a through j.

b. In presetting the transmitter tuning units for mo control,the settings given by the calibration charts are not very accurate. Therefore, for fine adjustments of the tuning unit controls, it is necessary to add the following steps after step i in paragraph 20.

(1) Set a frequency meter (such as Frequency Meter Set SCR-211-(*)) to the desired operating frequency.

(2) Place the frequency meter on top of the transmitter. Use about a foot of wire for an antenna on the meter.

(3) Adjust the M.O. control on the tuning unit for a zero beat note in the earphones connected to the frequency meter. The final setting of the control should be close to the chart reading.

(4) Readjust the DOUB. and INT. AMP. knobs on the tuning unit for maximum P.A. GRID reading.

28. Frequency Changing

a. CASE 1. Provision is made in the transmitter for simultaneously accommodating three tuning units, each of which may be instantly selected by the BAND SWITCH. Each tuning unit may be tuned to a separate frequency and left plugged in ready for use when needed. Since there are three sets of tuning units, it is possible to install three tuning units covered by one coil unit. With each unit pretuned to a different frequency, change of transmitter frequency is accomplished by resetting the BAND SWITCH to the desired channel and repeating the steps in subparagraphs 20 l through s.

b. CASE 2. The three tuning units plugged into the transmitter may not be covered by one coil unit. Change the transmitter frequency by resetting the BAND SWITCH to the desired channel, replacing the coil unit with the proper one, and then repeating the steps in subparagraphs 20 l through s.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

29. Special Tools Issued with Equipment

When Radio Transmitter BC-610-I is used in Radio Set AN/GRC-26, a T-wrench is provided to loosen the transmitter from the shelter deck so that the transmitter may be swung out from the wall of the shelter. This T-wrench is secured to the shelter wall to the left of the shelter door upon entering. Also located on the shelter wall opposite the side of the transmitter is a sledge hammer. This sledge hammer is used to smash and destroy the transmitter in cases where enemy capture is likely.

30. Definition of Preventive Maintenance

Preventive maintenance is work is performed on equipment (usually when the equipment is not in use) to keep it in good working order so that break-downs and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from occurring. Refer to AR 750-5.

31. General Preventive Maintenance Techniques

a. Use #0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with Solvent, dry cleaning (SD); then wipe the parts dry with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry cloth.

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch to remove dust from inaccessible places; be careful however, or mechanical damage from the air blast may result.

d. For further information on Preventive Maintenance techniques, refer to TB SIG 178.

32. Performing Preventive Maintenance

The following preventive maintenance operations should be performed by organizational personnel at the intervals indicated, unless these intervals are reduced by the local commander:

Caution: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

DAILY

1. Clean exterior of cabinet.
2. Check operation of lamps.
3. Check meter readings (par. 39).
4. Check all cords, cables, and connectors.

WEEKLY

Caution: Disconnect all power before performing the following operations. Upon completion, reconnect power and check for satisfactory operation.

1. Clean interior of cabinet, exterior of chassis, and all parts accessible without removal from cabinet.

2. Inspect all filter capacitors for leakage of dielectric, for bulging, and for heating.

3. Inspect all power transformers for excessive heating.

4. Inspect all fuses and fuseholders for corrosion, cracks, and lask of tension sufficient to insure good contact.

MONTHLY

Make visual inspection of the following; tighten and/or clean if necessary:

1. Tube and crystal sockets and pins for loose contacts, dirt, and corrosion. Check vacuum tubes; replace if necessary. Note that tubes including final letters W or Y in their nomenclature can replace tubes of the same type; for example, 6L6Y can replace 6L6.

2. Terminals of filter capacitors for corrosion.

3. Resistors, for blistering, discoloration, and other evidence of overheating.

4. Switches for dirt, corrosion, loose contacts, and unsatisfactory mechanical action.

5. Multiple connectors for dirt, corrosion, and loose contacts.

6. Wires, cords, and cables, for cracked, cut, and frayed insulation.

7. Terminal boards, for cracks, dirt, and loose connections.

8. Potentiometers for unsatisfactory electrical and mechanical operation.

9. Mountings, machine screws, and nuts, for mechanical looseness.

10. All visible terminals and connections, for loose connections and corrosion.

11. MFP (moistureproof-fungiproof) coatings, for breaks. (Retouch with a brush, if necessary.)

12. Finish, for scratches and bare spots. (Retouch, if necessary.)

13. Unshielded variable capacitors, for dirt, corrosion, and bent plates.

14. Choke coils, for dirt, corrosion, and damaged turns.

15. Insulators, for cracks and dirt.

16. Relay contacts for pits and build-ups and for improper alinement.

Section II. LUBRICATION AND WEATHERPROOFING

33. Lubrication

Use oil, engine (OE-10) for temperatures above 0°F; use oil, lubricating preservative, special (PL-Special) for temperatures below 0°F; use grease, instrument (GL) where needed, and in all temperatures. Lubricate only at the points specified, and wipe off excess lubricant. The following points require lubrication every 256 hours:

a. Capacitor Shaft Bearings. Place one or two drops of oil (PL-Special) on each of three bearings.

b. Tuning Control Shaft Bearings. Place one or two drops of oil (PL-Special) on each of two bearings.

c. Tuning Control Gears. Lubricate teeth sparingly with special oil (PL-Special).

34. Weatherproofing

a. General. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is fully explained in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are fully explained in TB SIG 66 and TB SIG 219.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are fully explained in TB SIG 75.

e. Lubrication. The effects of extreme cold and heat on materials and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat. Refer to paragraph 33 of this chapter for detailed instructions.

35. Rustproofing and Painting

a. When the finish on the case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces. Use #00 or #000 sandpaper to clean the surface down to the bare metal; obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with solvent (SD) to soften the rust and use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations. Refer to TM 9-2851.

Section III. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

36. Scope

a. The trouble shooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) is necessarily limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, trouble shooting by the operators is based on the performance of the equipment and the use of the senses in determining such troubles as burned-out tubes, cracked insulators, etc.

b. The paragraphs which follow in this section help in determining which stage is at fault and in localizing the fault in that stage to the defective item, such as a tube or fuse.

37. Visual Inspection

a. When Radio Transmitter BC-610-I fails to operate properly, a visual examination of the following items will ordinarily determine the faulty part.

(1) Wiring for loose or poorly soldered connections, frayed or burned insulation, or stretched leads.

(2) Terminal boards for broken lugs and signs of arcing.

(3) Split, cracked, or broken crystal holders.

(4) Resistors for blistering or discoloration caused by overheating.

(5) Fuses for corrosion or burn out.

(6) Worn, broken, or disconnected cords or plugs.

(7) Relay contacts burned because of overloads.

(8) Wires broken because of excessive vibration.

(9) Defective tubes.

b. When failure is encountered and the cause is not immediately apparent, check as many of the above items as is practicable before starting a detailed examination of the component parts of the system. If possible, obtain information from the operator of the equipment regarding performance at the time trouble appeared.

c. Visually inspect the antenna system for obvious abnormalities.

38. Trouble Shooting by Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 39) will help the operator to locate trouble in the equipment. The list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take. To use this list, follow the items in numerical sequence.

b. Action or Condition. For some items, the information given in the action or condition column consists of various switch and control settings under which the item is to be checked. For other items it represents an action that must be taken to check the normal indication given in the normal indications column.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator should perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed in paragraph 39 are those the operator can make without turning in the equipment for repairs. A reference in the table to chapter 6 indicates that the trouble cannot be corrected during operation and that trouble shooting by an experienced repairman is necessary. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

39. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indication	Corrective measures
PREPAR	1	EXCITER PLATE switch.	Set to NORMAL.		
	2	PLATE POWER switch.	Set to off (down).		

39. Equipment Performance Checklist (continued)

	Item No.	Item	Action or condition	Normal indication	Corrective measures
PREPARATORY	3	FILAMENT POWER switch.	Set to off (down).		
	4	HIGH VOLTAGE PROTECT switch.	Set to NORMAL.		
	5	PHONE-C.W. switch.	Set to C.W. or PHONE, as desired.		
	6	Transmitter tuning units.	Check selection of proper tuning units.		
	7	BAND SWITCH.	Set to channel corresponding to desired tuning unit.		
	8	Coil unit.	Check selection of proper coil unit for frequency desired.		
	9	M.O.-XTAL switch of tuning unit.	a. Set switch to M.O. for master oscillator control. b. Set switch to XTAL for crystal control. Check selection of proper crystal holder for frequency desired (par. 19).		
	10	P.A. PLATE TUNING dial.	Set to proper reading.		
START	11	FILAMENT POWER switch.	Set switch to on (up), wait 1 minute for filaments to reach operating temperature. Wait 30 minutes if transmitter is damp.	a. Green pilot lamp lights. b. FILAMENT VOLTAGE meter reads 5 to 5.3 volts.	a. Replace lamp. Check FUSES FS1, FS2, and FS4. b. Adjust FILAMENT VOLTAGE control.
EQUIPMENT PERFORM	12	EXCITATION METER SWITCH and EXCITATION METER.	Key set by key or microphone switch. EXCITATION METER SWITCH to: a. DOUBLER PLATE. b. INT. AMP. GRID. c. INT. AMP. PLATE. d. P.A. GRID.	EXCITATION METER reads: a. 25 to 45 ma. b. 1 to 8 ma. c. 125 to 175 ma. d. 60 to 100 ma.	a. If meter does not indicate in any position, check: (1) Installation and tuning of tuning unit. (2) Setting of BAND SWITCH. (3) Position of M.O. XTAL switch on tuning unit. b. If meter readings are improper, retune transmitter, or replace V8, V9, V10, or V11, if necessary.

39. Equipment Performance Checklist (continued)

	Item No.	Item	Action or condition	Normal indication	Corrective measures
EQUIP PERF	13	P.A. PLATE	a. Voice operation. b. C-w operation.	a. 200-260 ma. b. 200-300 ma.	Retune transmitter. Check coil unit L7. Operate OVERLOAD RESET. Check antenna. Replace V6, V7, or V16, if necessary.
STOP	14	EXCITER PLATE POWER switch, key or microphone switch.	Exciter switch set to NORMAL, key or mike switch released.	P.A. PLATE meter drops.	Check keying line.
	15	PLATE POWER switch.	Set to off (down).	Red light goes out.	Check, by listening, relay RY1 releases.
	16	FILAMENT POWER switch.	Set to off.	a. Green pilot lamp goes out. b. No voltage indication on FILAMENT VOLTAGE meter.	Disconnect a-c power input.

CHAPTER 4
AUXILIARY EQUIPMENT

---

40. Auxiliary Equipment

a. GENERAL. Radio Transmitter BC-610-I may be used with many standard radio communications equipments. The type used depends upon the tactical situation and individual communications requirements.

b. ANTENNA TUNING UNIT BC-939-(*). Antenna Tuning Unit BC-939-(*) is used when it is necessary to match the antenna to the operating frequency of the transmitter. This is necessary when a whip or a long wire antenna is used. The antenna tuning unit couples the output of the transmitter to the transmitting antenna. When a doublet antenna is used and is cut to match the operating frequency of the transmitter, the antenna tuning unit is not required. Antenna Tuning Unit BC-939-(*) is mounted on top of Radio Transmitter BC-610-I and is fastened securely by four wingnuts. The unit weighs 48 pounds. Refer to the contents of this instruction book for information concerning Antenna Tuning Unit BC-939-B controls and theory.

c. SPEECH AMPLIFIER BC-614-(*). (1) Speech Amplifier BC-614-(*) is an a-f amplifier which is designed for use with Radio Transmitter BC-610-I. The basic purpose of the speech amplifier is to raise the microphone output to a level suitable for the input of the a-f driver tubes of the transmitter. The speech amplifier has a jack which provides a means of keying the transmitter for c-w transmission from the speech amplifier. The speech amplifier is designed to permit the use of either a carbon microphone (such as Microphone T-17-(*) or T-45) or a dynamic microphone (such as Microphone T-50). A jack is provided for each on the front panel. Speech Amplifier BC-614-(*) has other uses in addition to those above, depending on the system with which the speech amplifier and radio transmitter are being used. The speech amplifier has two sockets which are located on the front panel (fig. 15). The socket on the lower left side of the panel connects the speech amplifier to the transmitter, and the socket on the right side of the panel connects the speech amplifier to auxiliary equipment. This auxiliary equipment depends on the use of the speech amplifier and transmitter in the particular system they are being used. Connections are provided between the two sockets on the speech amplifier for the following purposes:

(*a*) To key the transmitter from an auxiliary piece of equipment.

(*b*) To operate the plate power relay of the transmitter from an auxiliary piece of equipment.

(2) The socket located on the lower right side of the front panel provides connections from the speech amplifier for the following purposes:

(*a*) To ground the cathode of the sidetone oscillator when c-w sidetone is desired.

(*b*) To key the transmitter from an auxiliary piece of equipment.

(*c*) To connect Telephone EE-8(*)for remote control.

(*d*) To connect the press-to-talk mike switch.

(*e*) To connect the output of the sidetone amplifier to headphones for c-w monitoring.

(*f*) To control the plate power and antenna shorting relays in the transmitter.

(3) Speech Amplifier BC-614(*) contains its own plate and filament supply unit which draws approximately 40 watts from the 115-volt, 50-60 cycle, a-c source. When the speech amplifier is used with Radio Transmitter BC-610-I, the a-c supply for the speech amplifier is provided by the transmitter through the socket marked TO BC-610 (marked TO TRANSMITTER in some procurements).

d. JUNCTION BOX JB-70-(*). Junction Box JB-70-(*) is a junction point for most of the cords and cables which interconnect the various components of Radio Sets SCR-399-(*), SCR-499-(*), and AN/MRC-2(*). Power and control cords plug into the bottom and the side of the junction box. Key and headset connections are plugged into the jacks on the front panel. Junction Box JB-70-(*) serves as a control center for the station. The front panel controls provide for:

(1) Starting or stopping Power Unit PE-95-(*).

(2) Resetting the circuit breaker in the power mains.

(3) Selection of the 12-volt battery source.

(4) Control of transmission and reception.

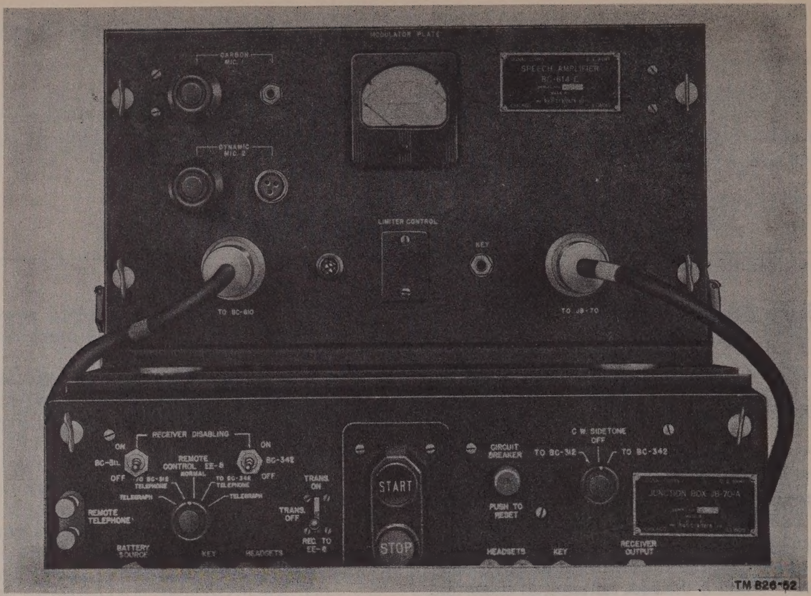

MODULATOR PLATE
CARBON MIC. 1
SPEECH AMPLIFIER BC-614-E
DYNAMIC MIC. 2
LIMITER CONTROL
KEY
TO BC-610
TO JB-70
RECEIVER DISABLING
ON
BC-311
OFF
REMOTE CONTROL EE-8
NORMAL
TO BC-312 TELEPHONE
TO BC-342 TELEPHONE
TELEGRAPH
TELEGRAPH
ON
BC-342
OFF
TRANS. ON
TRANS. OFF
REC. TO EE-8
REMOTE TELEPHONE
BATTERY SOURCE
KEY
HEADSETS
START
STOP
CIRCUIT BREAKER
PUSH TO RESET
C.W. SIDETONE
OFF
TO BC-312
TO BC-342
JUNCTION BOX JB-70-A
HEADSETS
KEY
RECEIVER OUTPUT
TM 826-52

Figure 15. Speech amplifier BC-614-E and Junction Box JB-70-A.

(5) Remote control operation.

(6) Choice of manual or automatic receiver disabling.

(7) Choice of receiver output to headset.

(8) A sidetone signal to monitor transmission during c-w operation.

e. Amplifier AM-141(*)/MRC. This r-f amplifier is used when the power output of Radio Transmitter BC-610-I is too low for the projected use. Amplifier AM-141(*)/MRC is generally mounted next to the radio transmitter. The r-f output of the radio transmitter is connected to the power amplifier which provides an output of approximately 2 kw to the transmitting antenna. Two sets of plug-in coils are provided with the power amplifier to provide the same tuning range as that of the transmitter. The plate and bias power supplies, along with a high-pressure blower necessary for continous operation, are housed in the amplifier cabinet.

f. Frequency Shift Exciter 0-39(*)/TRA-7. Frequency Shift Exciter 0-39(*)/TRA-7 is connected to the radio transmitter by a cord which plugs into a transmitter tuning unit crystal socket. The exciter takes the place of the crystal oscillator in the transmitter; it provides the frequency shift desired on the marking and spacing signals transmitted. The exciter unit contains an mo tunable from 2 to 6 mc. The output provides sufficient r-f driving power to permit multiplying in the low-power stages of the transmitter. Polar signals from the control unit (subpars. g and h below), originating from the d-c output mark and space impulses of the sending teletypewriter, shaft the oscillator frequency of the frequency shaft exciter. An audio monitoring circuit is built into the exciter unit to allow the operator to make a continuous check on the amount of frequency shift at the transmitter output.

g. Radioteletypewriter Control C-808/GRC-26A. This is the control center for Radio Set AN/GRC-26A. This unit selects the receiving and sending teletypewriter equipment used and the type of operation, full-duplex or one-way reversible, is controlled from the front panel. The adjustment of current for space and mark signals is accomplished by controls and switches together with meter indications. The control unit receives the polar and neutral signals from the converter (subpar. i below) and directs them to the teletypewriter equipment. The RTT control receives the signals from the teletypewriter equipment and directs them to the exciter unit, controls the disabling circuits in the transmitter and the receiver, and provides jacks for c-w and FS keying circuits. Radio Set AN/GRC-26 used Radioteletypewriter Control C-535/GRC-26 in place of Radioteletypewriter Control C-808/GRC-26 A.

h. Control Unit C-292(*)/TRA-7. Control Unit C-292 (*)/TRA-7 consists of an electronic repeater and a built-in power supply. The control unit converts neutral signals from a sending teletypewriter to polar signals for operation of Frequency Shift Exciter 0-39(*)/TRA-7. It also receives polar signals from Dual Diversity Converter CV-31(*)/TRA-7 (subpar. i below) and converts them to neutral signals for operation of a receiving teletypewriter. The control unit provides facilities for establishing full-duplex, or one-way reversible service.

i. Dual Diversity Converter CV-31(*)/TRA-7. The converter unit converts the i-f output of the two radio receivers in an RTT set-up into polar or neutral d-c TT signals. The output control circuit is provided with a feature which, when connected by a switch (DRIFT COMPENSATOR), tends to minimize the signal bias if the frequencies of the received signals drift away from their normal values. Radio Set AN/GRC-26A uses Dual Diversity Converter CV-182/GRC-26A in place of Dual Diversity Converter CV-31(*)/TRA-7.

j. Frequency Conversion Kit MC-509. This kit is used to extend the transmitter frequency range to cover 1 to 2 mc. It consists of a chest containing three Transmitter Tuning Units TU-61, three Transmitting Tuning Units TU-62, two Coil Units C-454, two Coil Units C-455, two each 100- and 50-uuf plug-in vacuum capacitors, and equipment to build a half-wave antenna. For full details, including the necessary changes to Antenna Tuning Unit BC-939-A, refer to TM 11-281.

41. References

For further information on the auxiliary equipment discussed in paragraph 40, refer to the following publications:

Technical Manual	Equipment
TM 11-264	Radio Set AN/GRC-26
TM 11-264A	Radio Set AN/GRC-26A
TM 11-278	Frequency Shift Exciters 0-39/TRA-7 and 0-39A/TRA-7, Dual Diversity Converters CV-31/TRA-7 and CV-31A/TRA-7, and Control Units C-292/TRA-7 and C-292A/TRA-7
TM 11-281	Radio Sets SCR-399-A and SCR-499-A
TM 11-624	Radio Sets AN/MRC-2 and 2A

CHAPTER 5
THEORY OF TRANSMITTER AND ANTENNA TUNING UNIT

42. Block Diagram

Radio Transmitter BC-610-I has a frequency range from 2 to 18 mc. This frequency range is covered by means of eight plug-in transmitter tuning units, seven plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and coil unit covers a portion of this range. The transmitter is equipped with an r-f section, a modulator section, and an h-v power supply.

a. The r-f oscillator stage consists of a type 6V6GT tube (V8) operating in a Harley Circuit. Frequency is determined either by mo or crystal control in the grid circuit, depending on the setting of the M.O. XTAL switch. When this switch is set for m-o control, the frequency can be varied over the range of the particular transmitter tuning unit used. When the switch is in position for crystal control, a fixed frequency is generated whose value depends on the particular crystal plugged into the jack provided for this purpose. Oscillations generated by the oscillator circuit are fed to the grid circuit of the buffer-doubler, a type 6L6 tube (V9).

b. The buffer-doubler stage consists of tube V9 (a type 6L6) and its associated circuit elements. The plate circuit of tube V9 is resonated by a parallel coil and capacitor tuned circuit contained in the transmitter tuning units. When the variable-frequency master oscillator is used, the buffer-doubler stage operates as a frequency doubler for all frequencies up to 12 mc, and as a frequency quadrupler for frequencies from 12 to 18 mc. Under crystal control, tube V9 operates as a buffer amplifier, a frequency doubler, or as a quadrupler depending upon the frequency range covered (par. 19e). R-f voltage from the plate of tube V9 is fed to the grids of i-p-a tubes.

c. The i-p-a stage consistor of two type 807 tubes (V10 and V11) connected in parallel to a tuned tank circuit located in the transmitter tuning unit. Screen and plate voltages are supplied by exciter rectifier V12. Bias voltage is supplied by bias rectifier V5. The output of the i-p-a stage is fed to the grid of the r-f p-a tube.

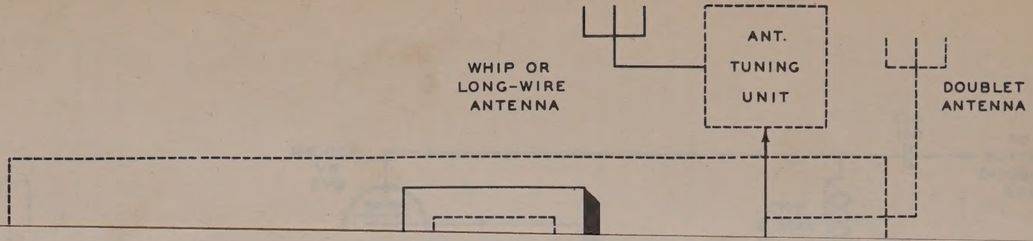
d. The power amplifier stage consists of a type 250TH tube (V16), operating in a neutralized class C circuit. Bias voltage is provided by bias rectifier V5. With the key up, the tube is biased to cut off the plate current of the tube. With the key down, the r-f voltage supplied by the i-p-a stage causes grid current to flow in the p-a stage. The r-f output power is taken from the plate tank circuit by a coupling coil; the coupling coil leads are short circuited by the contacts of a relay when the associated radio receivers are used for reception. This eliminates absorbtion at the transmitter frequency. Output power is fed to Antenna Tuning Unit BC-939-B when it is required to match the antenna being used to the transmitter. When a doublet antenna is used and is cut to the proper length for the operating frequency, the doublet is connected directly to the r-f output terminals of the transmitter.

e. The modulator stage consists of tubes V3 and V4 operating in a push-pull class B amplifier circuit; these tubes are biased near cut-off. The plates of tubes V3 and V4 are connected to the primary winding of a modulation transformer whose secondary is, during phone operation, connected in series with the h-v plate supply of r-f power amplifier tube V16. The audio power output voltage of the modulator section modulates the r-f p-a stage during phone operation, thereby superimposing the a-f voice wave on the r-f carrier wave. In this way, the r-f carrier is amplitude modulated.

f. A-f speech currents enter the modulator section and are impressed on the grids of audio driver tubes V1 and V2. These tubes operate as push-pull class A audio power amplifiers. The plate circuits of tubes V1 and V2 deliver their power to the primary of the driver transformer which connects to the grids of modulator tubes V3 and V4.

g. Exciter rectifier V12 supplies screen and plate power to buffer-doubler tube V9 and i-p-a tubes V10 and V11. Screen power is furnished to r-f oscillator V8 and is regulated by voltage regulator V13. The plate power of V8 is also provided by V12 and is regulated by voltage regulator tubes V14 and V15.

h. Bias rectifier tube V5 is operated with the positive terminal at ground potential. Thus, the negative potential will be below ground potential. This negative potential supplies plate power for tubes V1 and V2 and serves as a source of negative bias voltage for modulator tubes V3 and V4, class C p-a tube V16, and i-p-a tubes V10 and V11.


WHIP OR LONG-WIRE ANTENNA
ANT. TUNING UNIT
DOUBLET ANTENNA

CHAPTER 5
THEORY OF TRANSMITTER AND ANTENNA TUNING UNIT

42. Block Diagram

Radio Transmitter BC-610-I has a frequency range from 2 to 18 mc. This frequency range is covered by means of eight plug-in transmitter tuning units, seven plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and coil unit covers a portion of this range. The transmitter is equipped with an r-f section, a modulator section, and an h-v power supply.

a. The r-f oscillator stage consists of a type 6V6GT tube (V8) operating in a Harley Circuit. Frequency is determined either by mo or crystal control in the grid circuit, depending on the setting of the M.O. XTAL switch. When this switch is set for m-o control, the frequency can be varied over the range of the particular transmitter tuning unit used. When the switch is in position for crystal control, a fixed frequency is generated whose value depends on the particular crystal plugged into the jack provided for this purpose. Oscillations generated by the oscillator circuit are fed to the grid circuit of the buffer-doubler, a type 6L6 tube (V9).

b. The buffer-doubler stage consists of tube V9 (a type 6L6) and its associated circuit elements. The plate circuit of tube V9 is resonated by a parallel coil and capacitor tuned circuit contained in the transmitter tuning units. When the variable-frequency master oscillator is used, the buffer-doubler stage operates as a frequency doubler for all frequencies up to 12 mc, and as a frequency quadrupler for frequencies from 12 to 18 mc. Under crystal control, tube V9 operates as a buffer amplifier, a frequency doubler, or as a quadrupler depending upon the frequency range covered (par. 19e). R-f voltage from the plate of tube V9 is fed to the grids of i-p-a tubes.

c. The i-p-a stage consistor of two type 807 tubes (V10 and V11) connected in parallel to a tuned tank circuit located in the transmitter tuning unit. Screen and plate voltages are supplied by exciter rectifier V12. Bias voltage is supplied by bias rectifier V5. The output of the i-p-a stage is fed to the grid of the r-f p-a tube.

d. The power amplifier stage consists of a type 250TH tube (V16), operating in a neutralized class C circuit. Bias voltage is provided by bias rectifier V5. With the key up, the tube is biased to cut off the plate current of the tube. With the key down, the r-f voltage supplied by the i-p-a stage causes grid current to flow in the p-a stage. The r-f output power is taken from the plate tank circuit by a coupling coil; the coupling coil leads are short circuited by the contacts of a relay when the associated radio receivers are used for reception. This eliminates absorbtion at the transmitter frequency. Output power is fed to Antenna Tuning Unit BC-939-B when it is required to match the antenna being used to the transmitter. When a doublet antenna is used and is cut to the proper length for the operating frequency, the doublet is connected directly to the r-f output terminals of the transmitter.

e. The modulator stage consists of tubes V3 and V4 operating in a push-pull class B amplifier circuit; these tubes are biased near cut-off. The plates of tubes V3 and V4 are connected to the primary winding of a modulation transformer whose secondary is, during phone operation, connected in series with the h-v plate supply of r-f power amplifier tube V16. The audio power output voltage of the modulator section modulates the r-f p-a stage during phone operation, thereby superimposing the a-f voice wave on the r-f carrier wave. In this way, the r-f carrier is amplitude modulated.

f. A-f speech currents enter the modulator section and are impressed on the grids of audio driver tubes V1 and V2. These tubes operate as push-pull class A audio power amplifiers. The plate circuits of tubes V1 and V2 deliver their power to the primary of the driver transformer which connects to the grids of modulator tubes V3 and V4.

g. Exciter rectifier V12 supplies screen and plate power to buffer-doubler tube V9 and i-p-a tubes V10 and V11. Screen power is furnished to r-f oscillator V8 and is regulated by voltage regulator V13. The plate power of V8 is also provided by V12 and is regulated by voltage regulator tubes V14 and V15.

h. Bias rectifier tube V5 is operated with the positive terminal at ground potential. Thus, the negative potential will be below ground potential. This negative potential supplies plate power for tubes V1 and V2 and serves as a source of negative bias voltage for modulator tubes V3 and V4, class C p-a tube V16, and i-p-a tubes V10 and V11.

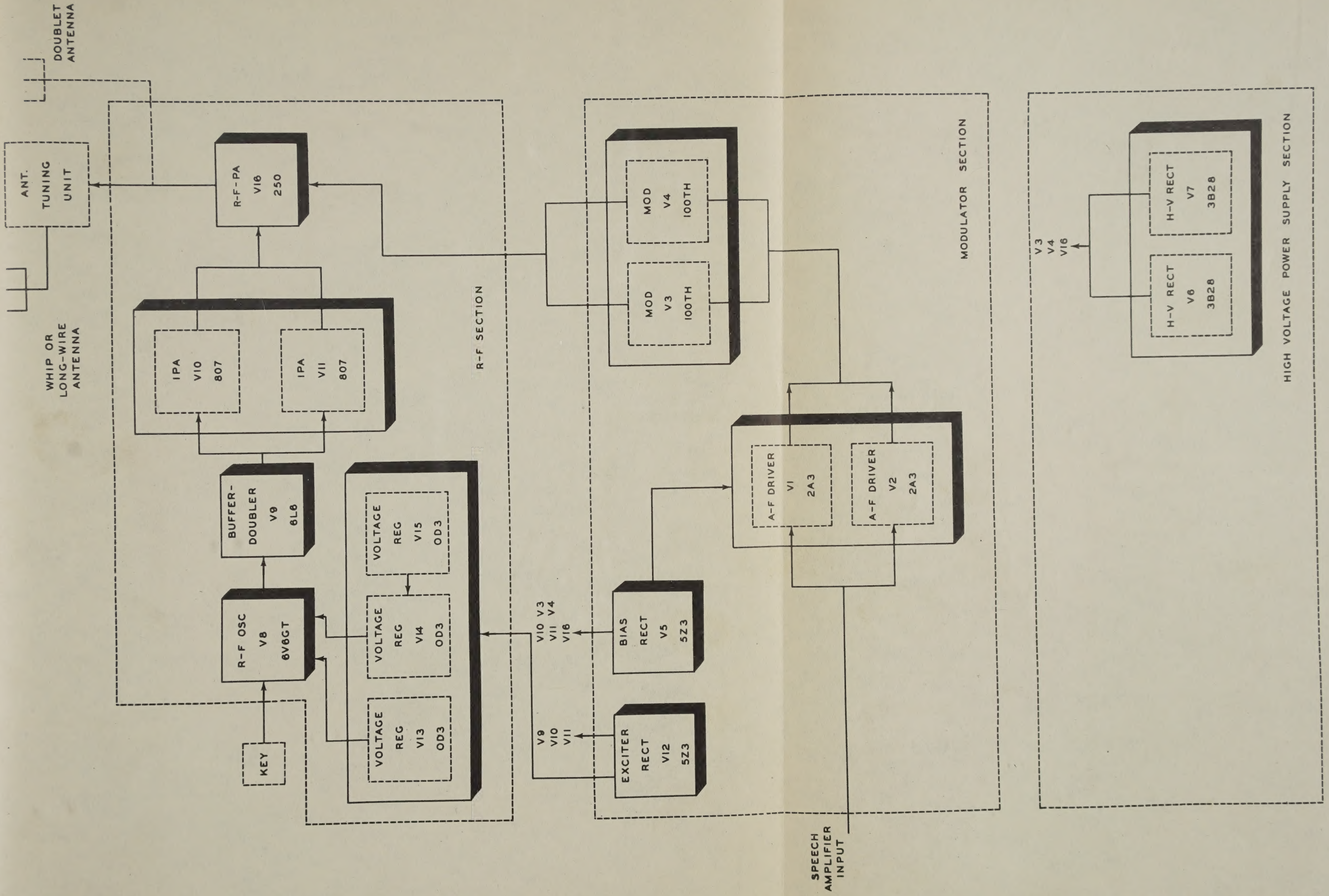
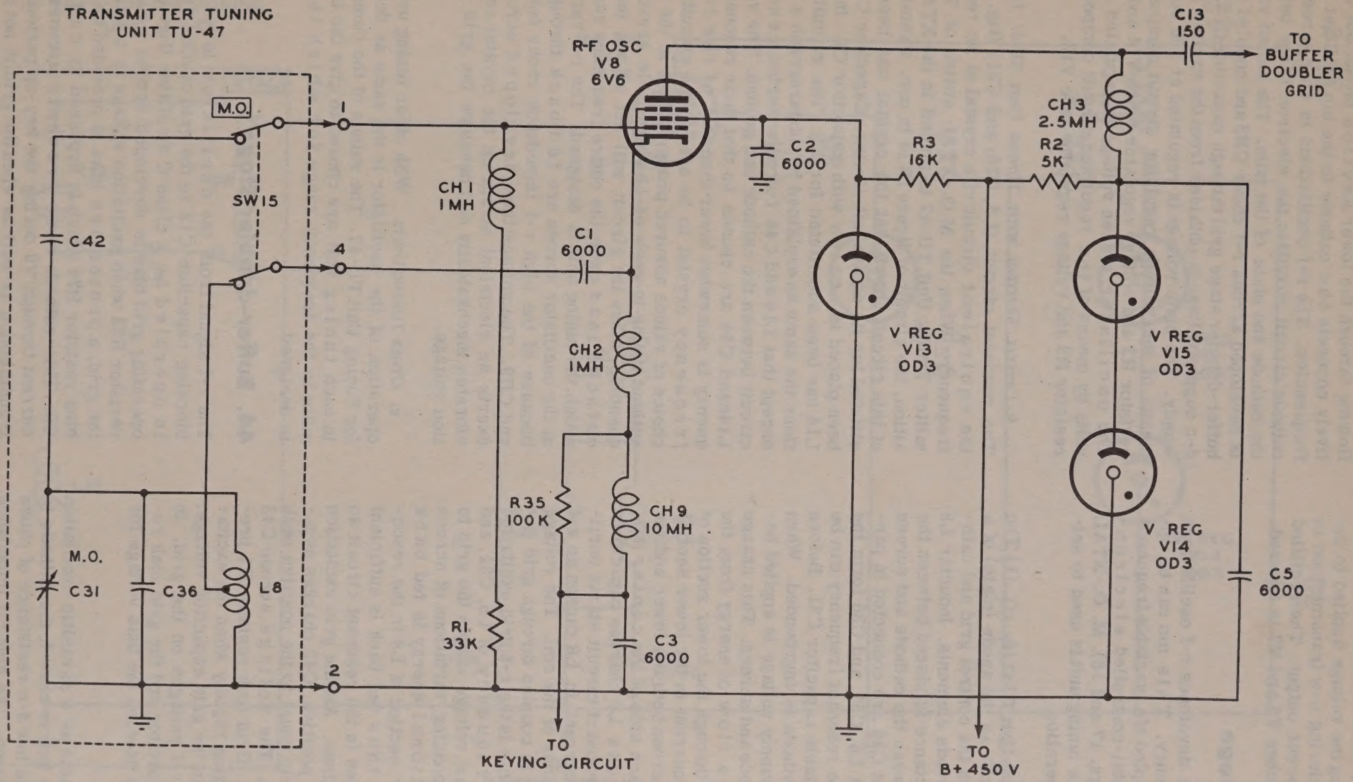

DOUBLET ANTENNA
WHIP OR LONG-WIRE ANTENNA
ANT. TUNING UNIT
R-F-PA V16 250
IPA V10 807
IPA V11 807
BUFFER-DOUBLER V9 6L6
R-F OSC V8 6V6GT
KEY
VOLTAGE REG V15 OD3
VOLTAGE REG V14 OD3
VOLTAGE REG V13 OD3
R-F SECTION
V10 V3
V11 V4
V16
V9
V10
V11
BIAS RECT V5 5Z3
EXCITER RECT V12 5Z3
MOD V4 100TH
MOD V3 100TH
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
MODULATOR SECTION
SPEECH AMPLIFIER INPUT
V3
V4
V16
H-V RECT V7 3B28
H-V RECT V6 3B28
HIGH VOLTAGE POWER SUPPLY SECTION

Figure 16. Radio Transmitter BC-610-I, block diagram.


TRANSMITTER TUNING
UNIT TU-47
M.O.
SW15
C42
M.O.
C31
C36
L8
1
4
2
CH1
1MH
C1
6000
CH2
1MH
R35
100K
CH9
10MH
R1
33K
C3
6000
TO
KEYING CIRCUIT
R-F OSC
V8
6V6
C2
6000
R3
16K
R2
5K
CH3
2.5MH
C13
150
TO
BUFFER
DOUBLER
GRID
V REG
V13
OD3
V REG
V15
OD3
V REG
V14
OD3
C5
6000
TO
B+450 V

NOTE:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM 826-11

Figure 17. Functional diagram of r-f oscillator as a vfo using Transmitter Tuning Unit TU-47.

i. The h-v rectifier uses rectifier tubes V6 and V7. The primary of the plate transformer is provided with a tap for raising the voltage applied to the plate of the r-f p-a tube during c-w transmission in order to obtain high power output. The rectified high voltage supplied by tubes V6 and V7 is filtered.

43. R-f Oscillator Stage

The r-f oscillator stage developes r-f oscillations which are stable in frequency. This mo can be operated as an electron-coupled vfo (variable frequency oscillator), or as a crystal-controlled electron-coupled oscillator (figs. 17 and 18). M. O.-XTAL switch SW15 located on the tuning unit is used to select the desired type of operation.

a. MO Control with Tuning Unit TU-47 (fig. 17). (1) The screen grid of tube V8 acts as the anode (plate) of a triode oscillator for which the control grid and cathode form the other two triode elements. Inductor L8 is connected so that inductance is placed between the grid and cathode and between the cathode and screen grid. Capacitors C31 and C36 are connected in parallel across L8 so that L8, C31, and C36 form the resonant LC circuit. The resonant frequency can be adjusted by means of variable capacitor C31. Before the key is closed, the cathode is ungrounded. When the key is closed, d-c supply voltage is applied between the oscillator cathode and screen. This change of screen voltage causes a flow of energy from the screen through C2 and through the lower section of L8 to the cathode. This current in the lower section of L8 induces a voltage across both the lower and the upper section of L8 on each side of the center tap. The voltage induced across L8 charges capacitors C31 and C36, and the resonant circuit starts oscillating. The oscillating current in L8 causes an r-f voltage across both sections of the coil. The voltage across the upper section is coupled through grid capacitor C42 to the grid; this is the r-f grid excitation voltage at the resonant frequency of L8, C31, and C36. As the excitation voltage varies the grid to cathode voltage, corresponding variations of screen voltage occur and additional energy is fed back through C2 to the lower section of L8 in the resonant circuit. The energy thus fed back is sufficient to make up for the losses in the resonant circuit so that its oscillations continue. As the grid excitation voltage swings the grid positive, C42 charges negatively to a voltage nearly equal to the positive peak of the excitation voltage. The voltage across C42 acts as a bias voltage. Grid leak resistor R1 prevents C42 from discharging rapidly when the excitation voltage is lower than the grid capacitor voltage. Choke CH1 isolates the r-f voltages on the grid. In other words, the grid capacitor and the grid leak resistor work together to develop the bias voltage for the oscillator stage.

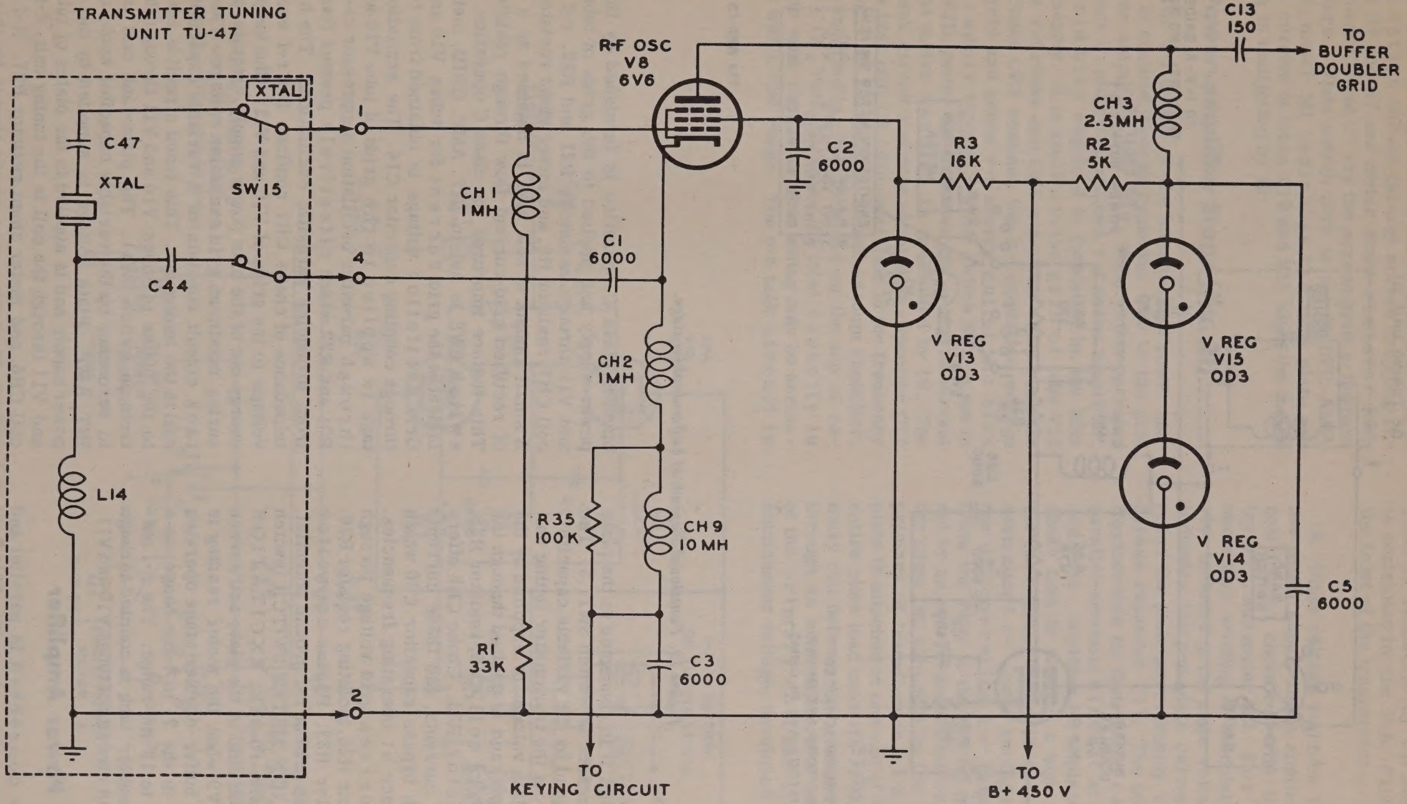
(2) Resistor R35 acts as a parasitic oscillation suppressor. When the key is closed, the cathode is connected through the low d-c resistance of choke coils CH2 and CH9 to ground. The high r-f impedance of choke coils CH2 and CH9 forces the r-f variations, at the oscillator screen, to feed back through the lower r-f impedance of the lower section of L8. Capacitor C1 is included to keep the d-c current from flowing through the lower section of L8, but effectively connects the cathode to the tap on L8 at radio frequencies. The r-f oscillations in the screen-to-cathode circuit modulate the electron flow between the cathode and plate of the tube. The output voltage is developed across r-f choke CH3 and coupled to the buffer-doubler stage grid through capacitor C13. The d-c supply voltage is obtained from the exciter power supply. The plate voltage is regulated at 300 volts by means of the voltage regulator circuit composed of resistor R2 and voltage regulator tubes V14 and V15. The oscillator screen voltage is regulated at 150 volts by means of the regulator circuit composed of resistor R3 and voltage regulator tube V13.

b. Crystal Control with Tuning Unit TU-47 (fig. 18). The resonant circuit (L8, C36, and C31) (fig. 17) is the equivalent circuit of a crystal at its resonant frequency. When the M.O.-XTAL switch of Transmitter Tuning Unit TU-47 is placed in the XTAL position, the circuit of figure 18 is in use. Examination of this circuit shows that the crystal has been substituted for its equivalent circuit. Capacitor C44 has been placed in series with capacitor C1. Inductor L14 has been substituted for L8. The circuit functions the same as explained in subparagraph a above, except that L14 and C44 form a series resonant circuit between the cathode and ground. The value of L14aand C44 are chosen so that their resonant frequency is somewhat lower than that of the lowest frequency crystal to be used in the circuit. This choice of values assures proper values in the circuit without tuning to each of the available crystal frequencies, since the circuit will act as an inductive cathode load over the entire frequency range for which the tuning unit is designed. The r-f variations at the oscillator screen are fed back through L14, because of the high r-f impedance choke coils CH2 and CH9. The voltage thus developed across L14 exerts an electrical strain on the crystal so that it vibrates mechanically and develops the grid excitation voltage.

c. Other Tuning Units. With other tuning units, the operation of the oscillator is the same as described for Tuning Unit TU-47. The values of the components in each tuning unit are chosen to give the best results in the frequency range for which the unit is designed.

44. Buffer-doubler Stage

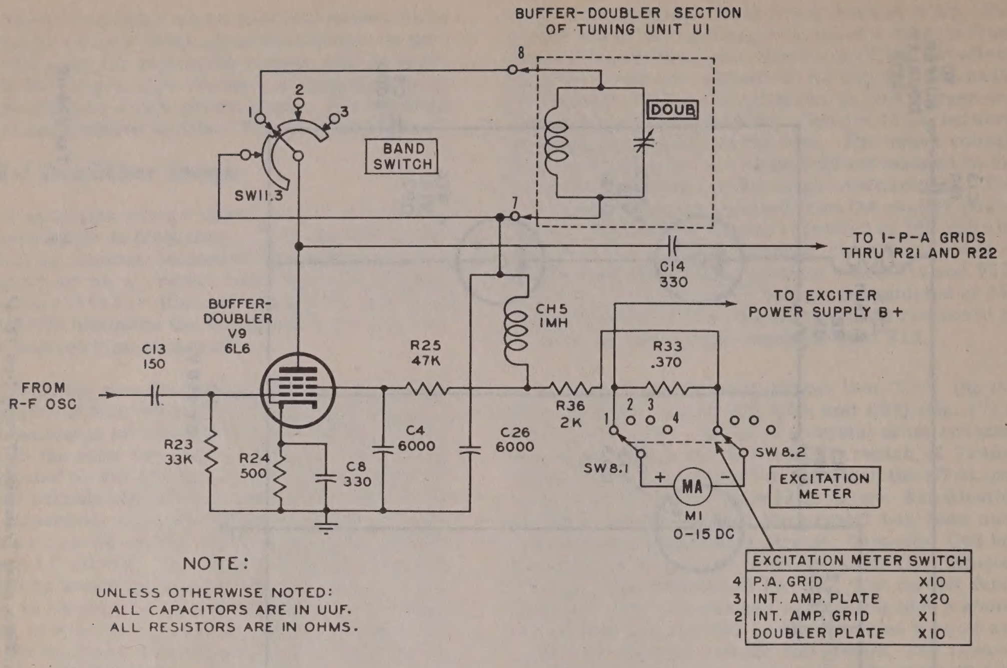
The r-f signal from the oscillator is fed through blocking capacitor C13 to the grid of tube V9, which is operated as a class C amplifier (fig. 19). The operating grid bias is developed across grid leak resistor R23 when excitation voltage is applied to the grid, a protective bias is provided by cathode bias resistor R24 which is bypassed by capacitor C8. This cathode bias prevents excessive plate current through V9 during the key-up periods of c-w transmission as well as when the grid is not properly excited because of oscillator failure. The plate-tank circuit consists of the variable capacitor and


TRANSMITTER TUNING
UNIT TU-47
XTAL
C47
XTAL
SW15
C44
L14
1
4
2
CH1
1MH
R1
33K
C1
6000
R-F OSC
V8
6V6
C2
6000
CH2
1MH
R35
100K
CH9
10MH
C3
6000
TO
KEYING CIRCUIT
R3
16K
R2
5K
V REG
V13
OD3
CH3
2.5MH
C13
150
TO
BUFFER
DOUBLER
GRID
V REG
V15
OD3
V REG
V14
OD3
C5
6000
TO
B+ 450 V

NOTE:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM 826-12

Figure 18. Functional diagram of r-f oscillator as a crystal oscillator using Transmitter Tuning Unit TU-47.


BUFFER-DOUBLER SECTION OF TUNING UNIT U1
8
7
1
2
3
SW11.3
BAND SWITCH
DOUB
TO 1-P-A GRIDS THRU R21 AND R22
C14 330
TO EXCITER POWER SUPPLY B+
BUFFER-DOUBLER V9 6L6
CH5 1MH
R25 47K
R33 .370
C13 150
FROM R-F OSC
R36 2K
1 2 3 4
SW 8.2
SW8.1
C4 6000
C26 6000
R23 33K
R24 500
C8 330
+
MA
−
M1 0-15 DC
EXCITATION METER
NOTE:
UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

	EXCITATION METER SWITCH	
4	P.A. GRID	X10
3	INT. AMP. PLATE	X20
2	INT. AMP. GRID	X1
1	DOUBLER PLATE	X10

TM 826-13

Figure 19. Functional diagram of buffer-doubler stage.

coil in the tuning unit and it is connected to the plate of tube V9 through contacts on switch SW11.3. The plate-tank circuit is tuned by the variable capacitor, which is controlled from the transmitter tuning unit by the DOUB. knob. Plate voltage is supplied by the exciter power supply, and is applied through the tuning unit coil, r-f choke coil CH5, resistor R36, and meter shunt resistor R33. Choke CH5 offers high impedance to r-f currents, and these currents flow to ground through bypass capacitor C26 which has negligible reactance at operating frequencies. The tube receives screen grid voltage through screen dropping resistor R25, isolating resistor R36, and meter shunt resistor R33. Bypass capacitor C4 maintains the screen grid at r-f ground potential. When the EXCITATION METER SWITCH (switch SW8), is set to DOUBLER PLATE, EXCITATION METER M1 indicates the sum of the plate and screen currents through tube V9 when the meter reading is multiplied by 10. The buffer-doubler stage operates as a buffer amplifier in the 2- to 4-mc range; as a quadrupler in the 12- to 18-mc range. The r-f output from the buffer-doubler tank is coupled through capacitor C14 to the grid circuits of tubes V10 and V11.

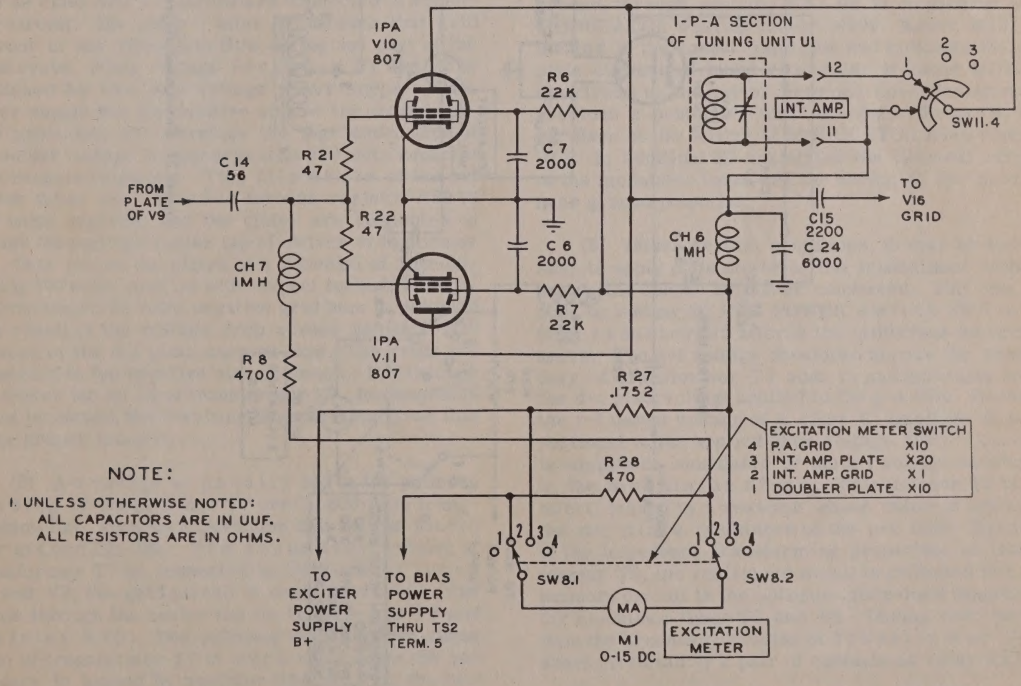
45. Intermediate Power Amplifier

Tubes V10 and V11 are connected in parallel and operate as a class C amplifier stage (fig. 20). Grid bias for class C operation is furnished by the bias power supply and applied to the grids of tubes V10 and V11 through resistors R21 and R22, r-f choke coil CH7, resistor R8, and meter shunt resistor R28. A small amount of self bias is obtained as a result of rectified grid-current flow through resistor R8. This feature improves the class C operation. When switch SW8 is set to INT. AMP. GRID, meter M1 indicates the grid current for tubes V10 and V11. Grid excitation voltage is obtained from tube V9 through coupling capacitor C14. The excitation voltage is applied to the grids of tube V10 and V11 through parasitic oscillation suppressor resistors R21 and R22 which effectively prevent this stage from producing parasitic oscillations. The high r-f impedance of choke CH7 confines the r-f excitation voltage to the grids of V10 and V11, thus keeping r-f energy out of the bias power supply circuits and insuring maximum grid excitation voltage. The plate-tank circuit consists of a variable capacitor and a coil in the tuning unit. This tuned circuit is connected to the plates of tubes V10 and V11 through the contacts on switch SW11. The plate-tank coil is tuned to resonance by the variable capacitor knob, marked INT. AMP. Plate voltage is supplied by the exciter power supply and is applied to the plates of tubes V10 and V11 through the coil in the tuning unit, r-f choke coil CH6, and meter shunt resistor R27. R-f energy is kept out of the power supply circuit by this action of choke CH 6 and bypass capacitor C24. The screen grids obtain voltage through screen dropping resistors R6 and R7 and meter shunt resistor R27. Capacitors C6 and C7 are the screen grid r-f bypass capacitors. When switch SW8 is set to INT. AMP. PLATE, meter M1 indicates the total plate and screen current of tubes V10 and V11 when the meter reading is multiplied by 20.

46. Power-amplifier Stage (fig. 21)

a. The r-f output of the intermediate power amplifier is coupled through capacitor C15 to the grid of power amplifier tube V16. Tube V16 is operated as a class C, plate-neutralized, r-f power amplifier. The grid bias required is furnished by the bias power supply. It is applied to the grid of tube V16 through r-f choke coil CH8 and meter shunt resistor R26. Choke CH8 confines the r-f excitation voltage to the grid and keeps r-f energy out of the bias power supply circuits. When switch SW8 is set to P.A. GRID, meter M1 indicates the p-a grid current when the meter reading is multiplied by 10. The plate tank circuit consists of variable capacitor C12 and p-a tank coil L7. For operation in the frequency range of 2 to 2.5 mc, the 50-uuf vacuum capacitor, C28, is inserted in clips provided on the top of capacitor C12. This increases the total capacity in the plate tank circuit so that tuning may be accomplished within this range. The p-a tank circuit is tuned to resonance by variable capacitor C12 which is controlled by the P.A. PLATE TUNING dial on the front of the transmitter.

b. Plate voltage for tube V16 is furnished by the h-v power supply and is applied to the plate through coil L7, r-f choke coil CH4, the coil of overload relay RY3, and meter M2. For phone operation, the secondary winding of modulation transformer T9 is also included in the plate voltage circuit. Meter M2 indicates the p-a plate current. R-f energy is kept out of the plate power supply circuit by means of bypass capacitor C11. The inductance of choke CH4 together with its distributed capacitance forms a parallel-resonant circuit at a frequency between 2 and 4 mc. Resistor R9 is placed in parallel with choke CH4 to prevent a high oscillating current in the choke coil. Tube V16 is operated as a plate-neutralized r-f power amplifier. This means that the degenerative r-f current which is fed back from the plate to the control grid, internally, is offset by an equal regenerative current fed back between the same two elements in the external circuit. The primary of transformer L7 is center tapped and the plate is attached at one end of the primary coil. The entire plate load consists of the section of the primary coil between that end and the center tap. Thus, through an autotransformer effect, the opposite end of the primary coil has at all times an equal instantaneous voltage, developed to the center tap,


IPA
V10
807
R6
22K
C7
2000
C14
56
R21
47
FROM
PLATE
OF V9
R22
47
C6
2000
CH7
1MH
R7
22K
IPA
V11
807
R8
4700
R27
.1752
R28
470
I-P-A SECTION
OF TUNING UNIT U1
12
INT. AMP.
11
1
2
3
SW11.4
TO
V16
GRID
C15
2200
C24
6000
CH6
1MH
EXCITATION METER SWITCH
4 P.A. GRID X10
3 INT. AMP. PLATE X20
2 INT. AMP. GRID X1
1 DOUBLER PLATE X10
SW8.1
SW8.2
MA
M1
0-15 DC
EXCITATION
METER
TO
EXCITER
POWER
SUPPLY
B+
TO BIAS
POWER
SUPPLY
THRU TS2
TERM. 5
TM 826-14

NOTE:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

Figure 20. Functional diagram of i-p-a stage.

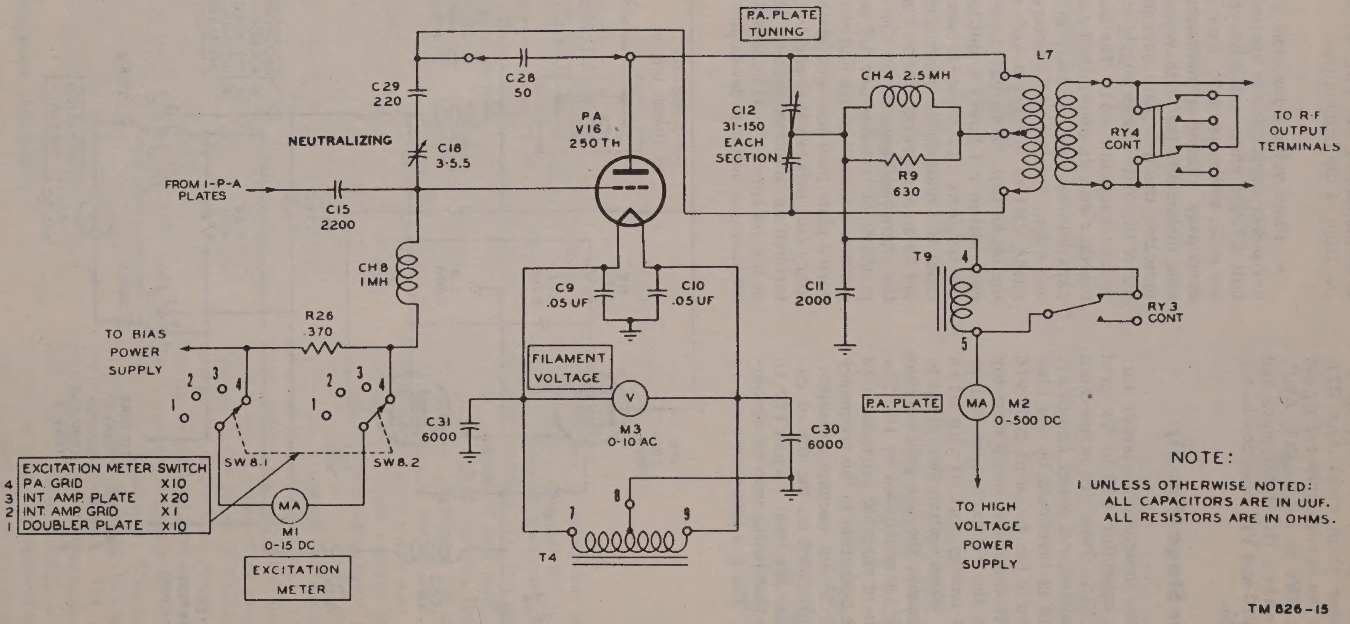

P.A. PLATE TUNING
L7
C29 220
C28 50
PA V16 250 TH
C12 31-150 EACH SECTION
CH4 2.5 MH
R9 630
RY4 CONT
TO R-F OUTPUT TERMINALS
NEUTRALIZING
C18 3-5.5
FROM I-P-A PLATES
C15 2200
CH8 1MH
C9 .05 UF
C10 .05 UF
C11 2000
T9
4
5
RY 3 CONT
R26 .370
TO BIAS POWER SUPPLY
1 2 3 4
SW 8.1
SW 8.2
FILAMENT VOLTAGE
V
M3 0-10 AC
C31 6000
C30 6000
P.A. PLATE
MA
M2 0-500 DC
EXCITATION METER SWITCH
4 PA. GRID X10
3 INT. AMP. PLATE X20
2 INT. AMP GRID X1
1 DOUBLER PLATE X10
MA
M1 0-15 DC
EXCITATION METER
7 8 9
T4
TO HIGH VOLTAGE POWER SUPPLY
NOTE:
1 UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.
TM 826-15

Figure 21. Functional diagram of r-f p-a stage.

which is exactly 180° out of phase with the plate circuit voltage and is equal in amplitude. The connection from this end of the primary coil in L7 is coupled back to the control grid of tube V16 through capacitors C29 and C18 in series. Variable capacitor C18 is used for neutralizing, it has a range of 3 to 5.5 uuf and is adjusted to provide the same amount of capacity in the external circuit between the control grid and plate as there is within the tube between these same two elements. When tube V16 is replaced, the stage should be readjusted for proper neutralization and efficient operation (par. 66). Capacitor C29 has a low reactance at the signal frequency and serves only as a d-c blocking capacitor to isolate neutralizing capacitor C18 from the high d-c voltage of the p-a plate circuit. Bypass capacitors C9 and C10 maintain the filament circuit of tube V16 at r-f ground potential, and filament meter M3 indicates the a-c voltage applied to the filament. R-f power is taken from the p-a tank circuit by means of a link, inductively coupled to the tank coil, and power is fed to the antenna tuning unit through a short coaxial cable. When the transmitter is not in operation, contacts on relay RY4 short circuit the coupling link and detune the transmitting antenna so that it does not absorb signal energy at the frequency to which the radio receiving equipment is tuned.

47. Modulator Section (fig. 22)

a. A-F Driver Stage. (1) Tubes V1 and V2 are operated as class AB1 a-f amplifiers connected in a push-pull circuit. The suffix 1 after AB denotes that grid current is not allowed to flow during any part of the input cycle. Plate voltage for tubes V1 and V2 is furnished by the bias-voltage power supply. This power supply has the positive side of the output voltage grounded, and therefore the ungrounded side of the output voltage is approximately 360 volts negative with respect to ground. The filaments of the a-f driver tubes are connected through resistor R20 to 360 volts negative, and the plates are connected to ground through the center tap of driver transformer T8. This places the plates at a potential of approximately 300 volts positive with respect to the filaments. Approximately 60 volts negative grid bias is obtained as a result of the voltage drop across resistor R20 because of the d-c plate-current flow. The grids are connected to the negative side of resistor R20 through the center tap on input transformer T7. Resistor R20 is not bypassed; the resulting degeneration gives this stage proper linearity.

(2) A-f voltage is usually fed to the primary winding of transformer T7 over a 500-ohm transmission line, such as a telephone line or the audio pair in Cord CD-764. The secondary winding of transformer T7 is connected to the grids of tubes V1 and V2; the grid circuit is completed to the filaments through the center tap on transformer T7 and resistor R20. The primary-to-secondary turns ratio of transformer T7 is such that when the secondary is loaded by resistor R14 and R15, the impedance, looking into the primary winding, is 500 ohms. This is the correct impedance to properly terminate the a-f transmission line from the speech amplifier. The driver stage is coupled to the modulator stage by transformer T8. The secondary winding of transformer T8 is loaded by resistors R16 and R17 to provide a more constant plate-load impedance for the driver tubes.

b. Modulator Stage. (1) Tubes V3 and V4 are operated as a class B push-pull modulator stage. Class B operation requires that the tubes be biased near plate current cut-off. Under this condition, the plate current which flows when no signal is applied to the grids is relatively small; but when peak signal voltage is applied to the grids the plate current may rise to several times the zero signal input value. Grid bias for tubes V3 and V4 is furnished by the bias power supply, and during phone operations, is applied to the grids through contacts on relay RY3 and the secondary center tap on transformer T8. The bias voltage is set to the correct value for PHONE operation by potentiometer R12, the MODULATOR BIAS control on the front of the transmitter. During c-w operation, potentiometer R12 is disconnected by contacts on relay RY3, and the total output voltage of the bias power supply is applied to the grids of tubes V3 and V4 through resistor R34. This voltage is sufficient to cause plate current cut-off. Plate voltage for the modulator stage is furnished by the h-v power supply, and is applied to the plates through the center tap on modulation transformer T9. The center tap of transformer T3, which supplies the filaments of tubes V3 and V4, is connected to ground, through resistor R5. R5 is in parallel with MODULATOR PLATE meter M101. Meter M101 is located in the speech amplifier and indicates the d-c plate current of tubes V3 and V4. If meter M101 or the circuit to the meter becomes open, resistor R5 provides a protective bias for tubes V3 and V4, regardless of the setting of MODULATOR BIAS control R12. In addition, R5 maintains the filament circuit of the modulator tubes and the wiring to the meter near ground potential.

(2) Under certain conditions, it may be necessary to apply plate power to the transmitter without having the speech amplifier connected. This can be done by setting PLATE POWER switch SW6 to on (up); resistor R5 affords the protection described above. The a-f voltage developed across the secondary of transformer T9 adds to and subtracts from the d-c plate voltage applied to the p-a tube. Because the r-f output voltage of a class C amplifier is proportional to the applied plate voltage, the r-f carrier is amplitude modulated by the a-f voltage developed in the modulator stage. Transformer T9 is, in effect, loaded by a resistor whose value is equal to the d-c plate resistance of the p-a tube. Because of the impedance transforming properties of transformer T9, the resistance which is reflected into the primary circuit is the optimum plate-load impedance for modulator tubes V3 and V4. During c-w operation, the secondary winding of transformer T9 is short circuited by a pair of contacts on relay RY3.

48. Power Supplies

a. Exciter Power Supply (fig. 23). The exciter power supply furnishes plate and screen grid voltage for oscillator tube V8, buffer-doubler tube V9 and i-p-a tubes V10 and V11. Filament transformer T4 has three 1-v secondary windings. They are: 5 volts at 10.5 amperes, 6.3 volts at 3.5 amperes, and 5 volts at 3 amperes. The 5-volt, 10.5-ampere winding furnishes filament current for r-f p-a tube V16; the 6.3-volt, 3.5-ampere winding furnishes heater current for tubes V8, V9, V10, and V11; and the 5-volt, 3-ampere winding furnishes filament current for rectifier tube V12. Transformer T4 has a tapped primary winding to compensate for power supply or line voltage variations. If the line voltage furnished is low, connect the leads to terminals 1 and 2, but if the voltage is high, connect the leads to terminals 1 and 3. Rectifier tube V12 is connected in a full-wave rectifier circuit. The a-c plate voltage for tube V12 is furnished by the h-v secondary winding of transformer T5. Transformer T5 has a tapped primary winding to compensate for power supply or line voltage variations. If the voltage furnished is low, connect the leads to terminals 1 and 2, but if the voltage is high, connect the leads to terminals 1 and 3. The rectified output voltage of tube V12 is applied to a pi-section filter consisting of filter capacitors C16 and C17 and choke L1. R4 is in series with capacitor C17 to prevent key clicks because of excessive voltage surges when the transmitter is keyed. Resistor R10 is the power supply bleeder resistor which serves to discharge the filter capacitors when the power supply is turned off.

b. Bias Power Supply (fig. 24). The bias power supply furnishes filament and plate voltage for a-f driver tubes V1 and V2, and bias voltage for tubes V3, V4, V10, V11, and V16. Transformer T1 supplies filament and plate voltage to rectifier tube V5 which is connected as a full-wave rectifier. The rectifier output voltage is applied to a choke input pi-section filter consisting of filter chokes L2 and L3, and capacitors C20 and C21. Adjustable resistor R11 and potentiometer R12, connected across the output of the power supply, serve as bleeder resistors. The voltage regulation of this power supply is relatively good because of the use of a choke input filter and a high value of bleeder current. An adjustable tap is provided on resistor R11 to allow adjusting the bias voltage to tubes V10, V11, and V16 to the correct value.

c. H-V Power Supply (fig. 25). (1) The h-v power supply furnishes d-c plate voltage for modulator tubes V3 and V4, and r-f p-a tube V16. Tubes V6 and V7 are connected in a full-wave rectifier circuit. Transformer T2 furnishes filament current to the rectifier tubes; transformer T6 furnishes the h-v alternating current to the rectifier plates. Transformer T2 has a dual purpose tapped primary. First, it provides an adjustable primary coil to compensate for large power supply or line voltage differences. Use terminals 1 and 2 when the voltage is low, or terminals 1 and 3 when the voltage is high. Second, the use of terminal 2 when a low voltage is applied to the equipment allows a higher voltage, through an autotransformer effect, to be furnished from terminal 3 for activating relays RY1, RY2, and RY4. The primary of transformer T6 is divided into two sections which are connected in parallel. When SW4 is in the NORMAL position, the primary sections of T6 are connected directly across the a-c input line. This allows a high secondary-to-primary turns ratio and a secondary voltage of 4,800 volts with switch SW7 in the PHONE position, or 5,760 volts with switch SW7 in the C.W. position. When SW4 is in the HIGH VOLTAGE PROTECT position, resistor R37 is in series with the primary sections of T6, reducing the input voltage. The amount of voltage reduction depends upon the load placed upon the power supply, and is approximately one-half the value stated above (2,400 volts with SW7 in the PHONE position, or 2,880 volts in the C.W. position) when the transmitter is properly loaded for normal operation. The HIGH VOLTAGE PROTECT position is used during tune-up operations. The rectified high voltage is applied to an L-section filter consisting of filter choke L4, and filter capacitors C19 and C23 in parallel. Filter Choke L4 has a very closely spaced spark gap built across its terminals. A surge voltage appears at the input to the filter choke when power to transformer T6 is switched on or off. When this surge voltage is greater than the break-down voltage rating of the gap, it is dissipated across the gap. This action prevents a voltage which may be in excess of the insulation rating of the choke from developing across filter choke L4.

(2) Bleeder resistor R13 is connected across the output of the power supply and serves to discharge capacitors C19 and C23 when the power is turned off. Switch SW7, the PHONE-C.W. switch, reduces the voltage applied to the plates of the rectifier tubes during phone operation. The coil of relay RY5 is connected between the center tap of the h-v secondary winding of transformer T6 and ground. Its purpose is to actuate contacts which disconnect the primary voltage from transformer T6 when excessive current flows through the relay coil. This prevents damage to the h-v rectifier tubes because of overloads.

49. Switches

a. Filament Power Switch SW1 (fig. 26). FILAMENT POWER switch SW1 is located on the front panel of the transmitter. When set to on, it applies a-c power to the primary windings of transformers T1, T2, T3, T4, and T103. Transformer T103 is the speech amplifier power supply transformer. It also applies a-c voltage to lamp LM3 which lights the green jewel above the switch.

b. Exciter Plate Power Switch SW3 (fig. 27). EXCITER PLATE POWER switch SW3 is located on the front panel of the transmitter. When set to on (up), one pair of contacts applies a-c power to the primary winding of transformer T5, and another pair of contacts grounds the cathode circuit of oscillator tube V8. This switch is used to apply plate power to the exciter stages during tune-up operations.

c. High-Voltage Protect Switch SW4 (fig. 28). HIGH VOLTAGE PROTECT switch SW4 is located on the

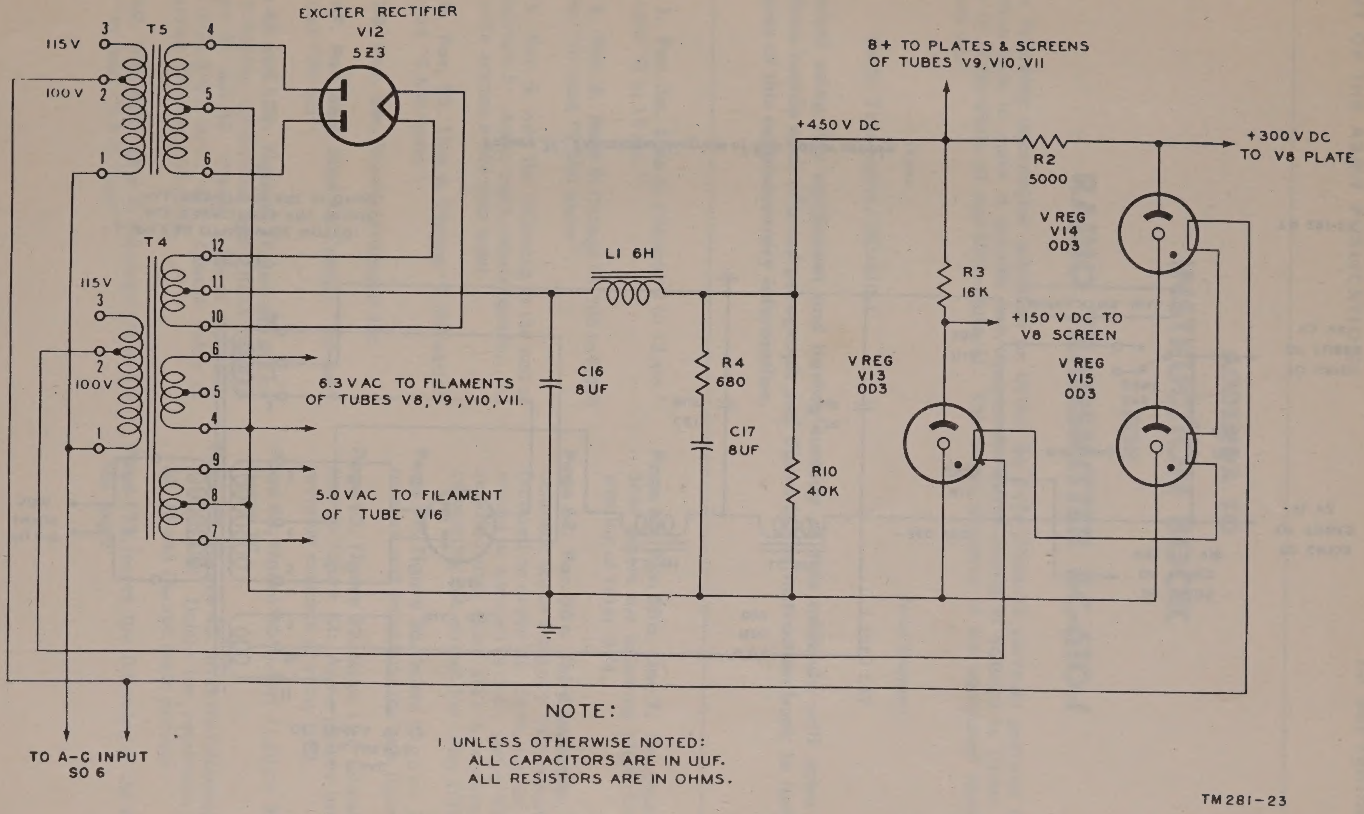
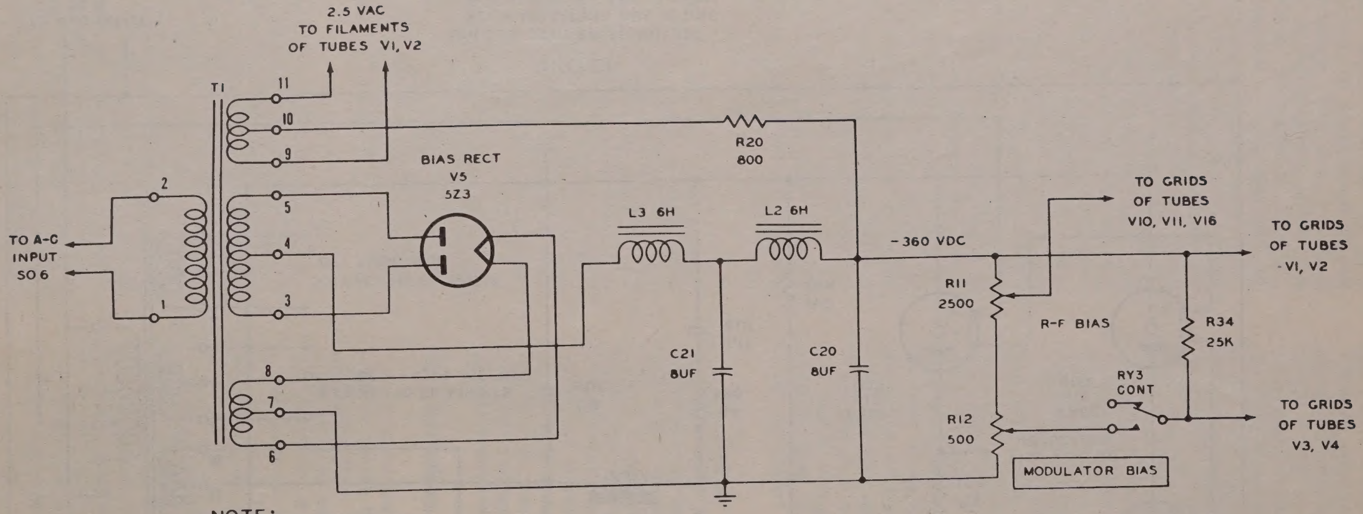

EXCITER RECTIFIER
V12
5Z3
115V
100V
T5
3
2
1
4
5
6
T4
115V
100V
3
2
1
12
11
10
6
5
4
9
8
7
6.3 VAC TO FILAMENTS OF TUBES V8, V9, V10, V11.
5.0 VAC TO FILAMENT OF TUBE V16
L1 6H
C16 8UF
R4 680
C17 8UF
R10 40K
+450 V DC
B+ TO PLATES & SCREENS OF TUBES V9, V10, V11
R2 5000
+300 V DC TO V8 PLATE
R3 16K
+150 V DC TO V8 SCREEN
V REG V13 OD3
V REG V14 OD3
V REG V15 OD3
TO A-C INPUT SO 6
NOTE:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.
TM281-23

Figure 23. Functional diagram of exciter power supply.


2.5 VAC
TO FILAMENTS
OF TUBES V1, V2
T1
11
10
9
2
1
5
4
3
8
7
6
TO A-C
INPUT
SO 6
BIAS RECT
V5
5Z3
R20
800
L3 6H
L2 6H
C21
8UF
C20
8UF
-360 VDC
R11
2500
R12
500
R-F BIAS
R34
25K
RY3
CONT
MODULATOR BIAS
TO GRIDS
OF TUBES
V10, V11, V16
TO GRIDS
OF TUBES
V1, V2
TO GRIDS
OF TUBES
V3, V4
TM 281-24

NOTE:

1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.

Figure 24. Functional diagram of bias power supply.

THIS ADDENDA WILL REMAIN IN EFFECT ONLY UNTIL THE INFORMATION IS PUBLISHED IN AN OFFICIAL DEPARTMENT OF THE ARMY PUBLICATION.

ADDENDA
15 SEPTEMBER 1952

ADDENDA TO
INSTRUCTION BOOK
FOR
RADIO TRANSMITTER BC-610-I

The following information published on Order No. 3464-Phila-52 corrects portions of this instruction book to make it useable for equipments manufactured in addition to Order No. 1908-Phila-51, 3164-Phila-51 and 3201-Phila-51. The serial numbers of the equipment covered in the addenda are:

Name	*Serial Numbers*
Radio Transmitter BC-610-I	1 thru 587

Personnel using this equipment and having custody of this addenda will enter suitable notations beside each affected paragraph and figure in the instruction book to indicate the presence of this supplementary information.

Page 1. Par. 3a. Line 5. Change "2 to 13 mc." to read "2 to 18 mc."

Page 5. Par. 5. Item 9. Change "1,700 to 2,000 watts" to read "2,500 watts".

Page 5. Par. 5. Add the following to the end of paragraph 5: Audio input requirements....... 17 volts across a 500 ohm input.

Page 6. Par. 10. Line 6. Change "2,000 watts" to read "2,500 watts".

Page 33. Par. 33c. Delete paragraph 33c.

Page 47. Par. 46a. Line 15. Change "50-uuf" to read "55-uuf".

Pages 48 and 135. Figures 21 and 66. Make the following corrections and additions to figure 21 and 66. Change value of capacitor C18 from 3-5.5 to 3.5-5.7. Change value of capacitor C28 from 50 to 55.

Page 49. Par. 46b. Line 7. Change "3 to 5.5 uuf" to read "3.5-5.7 uuf".

Page 63. Par. 50a. Line 7. On order number 3464 insert the following after, T6: and the winding of relay RY4,.

Page 63. Par. 50c. Third sentence. The third sentence doesn't apply to equipment manufactured on order No. 3464, and the following should be substituted: Relay RY4 is only actuated after relay RY1 has been actuated completing the circuit for relay RY4.

Page 56. Figure 26. Delete figure 26, in the manual, and substitute the new figure 26.

Page 62. Figure 32. Make the following addition to figure 32: Add a jumper between the movable contacts of relay RY2.

Page 66. Figure 36. Insert figure 36.1 after figure 36.

Page 73. Figure 45. Make the following changes in figure 45: Delete the reference symbols, J4, J5 and J6, and their arrows.

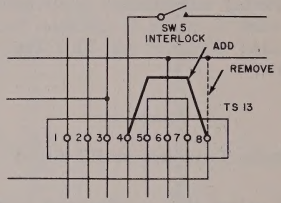
Page 115. Insert the following at the bottom of the page:

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

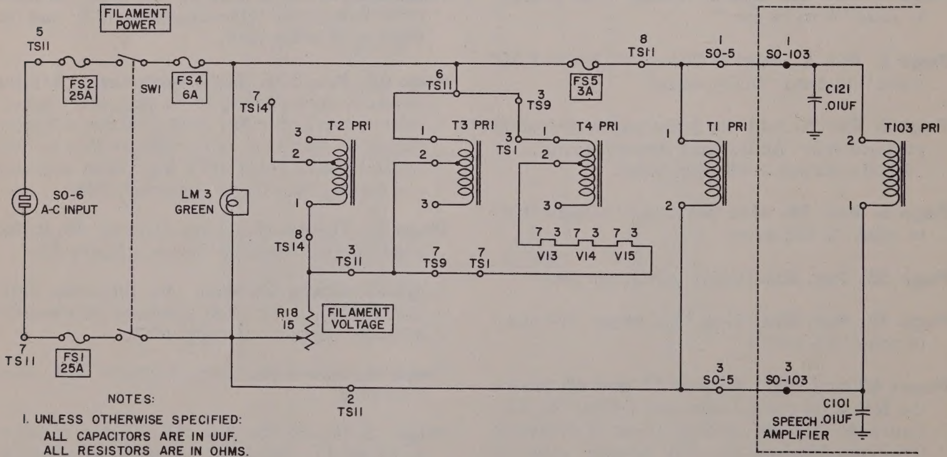
Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
* *	* * *	* * *	
T9 (on order No. 3164)	TRANSFORMER, AF: modulation type; pri 21,000 ohms CT, secd 8000 ohms at 250 ma DC 7000 RMS test V; HS metal case; 7-5/32 in. h x 6-3/32 in. lg. x 5-9/32 in. wd less term; 250 w max; freq response 150 to 3000 CYC ± 2 bd; 5 screw type term on bottom of case; four 1/4-20 studs on 3-11/16 in. x 3 in. mtg/c; Hallicrafters part/dwg #55C202	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	

Page 135. Figure 66. Change the connection of the lead between terminal 11 of TS14 and the lower center connection, movable arm, of switch SW4, to go from terminal 11 of TS14 and the lower right hand connection, stationary contact, of switch SW4; as the schematic is in error.

Page 135. Figure 66. Make the following changes, as shown in the following partial schematic, on figure 66.


SW 5
INTERLOCK
ADD
REMOVE
TS 13
1 2 3 4 5 6 7 8

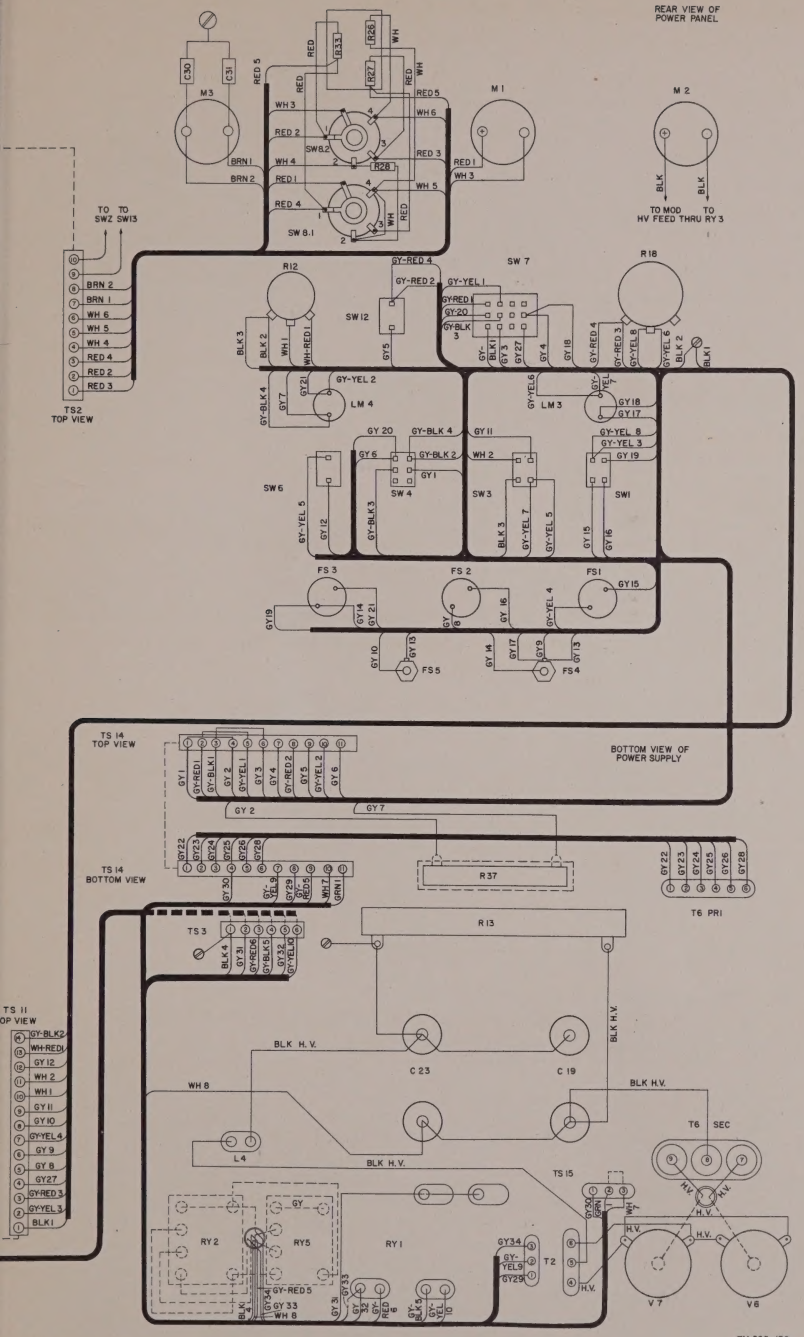
Page 135. Figure 66. Add figure 67 after figure 66.


FILAMENT POWER
5
TSII
FS2
25A
SWI
FS4
6A
7
TS14
6
TSII
3
TS9
8
TSII
FS5
3A
I
SO-5
I
SO-103
CI2I
.OIUF
T2 PRI
T3 PRI
T4 PRI
TI PRI
TIO3 PRI
3
2
I
3
TSI
SO-6
A-C INPUT
LM 3
GREEN
8
TS14
3
TSII
7
TS9
7
TSI
7 3 7 3 7 3
VI3 VI4 VI5
RI8
I5
FILAMENT VOLTAGE
7
TSII
FSI
25A
2
TSII
3
SO-5
3
SO-103
CIOI
SPEECH .OIUF
AMPLIFIER

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.
2. TIO3 IS IN THE SPEECH AMPLIFIER

TM 826-20

Figure 26. Functional diagram of FILAMENT POWER switch.


REAR VIEW OF POWER PANEL
M 1
M 2
M3
C30
C31
R33
R26
R27
R28
SW8.2
SW 8.1
TO MOD HV FEED THRU
TO RY 3
TO SWZ
TO SW13
TS2 TOP VIEW
R12
SW 12
SW 7
R18
LM 4
LM 3
SW 6
SW 4
SW 3
SWI
FS 3
FS 2
FSI
FS 5
FS 4
TS 14 TOP VIEW
BOTTOM VIEW OF POWER SUPPLY
TS 14 BOTTOM VIEW
R 37
T6 PRI
TS 3
R 13
TS 11
OP VIEW
BLK H.V.
C 23
C 19
WH 8
L4
T6 SEC
TS 15
RY 2
RY5
RY 1
T2
V 7
V 6
H.V.
TM 826-150

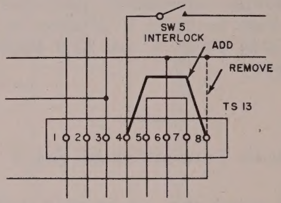
mitter BC-610-I.

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

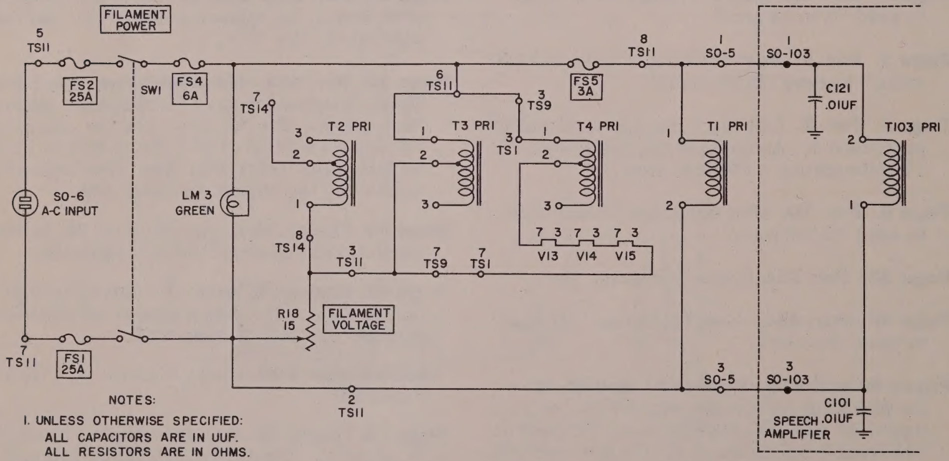
Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
* *	* * *	* * *	
T9 (on order No. 3164)	TRANSFORMER, AF: modulation type; pri 21,000 ohms CT, secd 8000 ohms at 250 ma DC 7000 RMS test V; HS metal case; 7-5/32 in. h x 6-3/32 in. lg. x 5-9/32 in. wd less term; 250 w max; freq response 150 to 3000 CYC $\pm$ 2 bd; 5 screw type term on bottom of case; four 1/4-20 studs on 3-11/16 in. x 3 in. mtg/c; Hallicrafters part/dwg #55C202	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	

Page 135. Figure 66. Change the connection of the lead between terminal 11 of TS14 and the lower center connection, movable arm, of switch SW4, to go from terminal 11 of TS14 and the lower right hand connection, stationary contact, of switch SW4; as the schematic is in error.

Page 135. Figure 66. Make the following changes, as shown in the following partial schematic, on figure 66.


SW 5
INTERLOCK
ADD
REMOVE
TS 13
1
2
3
4
5
6
7
8

Page 135. Figure 66. Add figure 67 after figure 66.


FILAMENT POWER
5
TSII
FS2
25A
SWI
FS4
6A
7
TS14
T2 PRI
3
2
1
8
TS14
6
TSII
T3 PRI
1
2
3
3
TSII
7
TS9
7
TSI
3
TS9
3
TSI
T4 PRI
1
2
3
7 3 7 3 7 3
VI3 VI4 VI5
FS5
3A
8
TSII
I
SO-5
TI PRI
I
2
I
SO-103
CI2I
.OIUF
TI03 PRI
2
I
SO-6
A-C INPUT
LM 3
GREEN
RI8
15
FILAMENT VOLTAGE
7
TSII
FSI
25A
2
TSII
3
SO-5
3
SO-103
CI01
.OIUF
SPEECH
AMPLIFIER

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.
2. TI03 IS IN THE SPEECH AMPLIFIER

TM 826-20

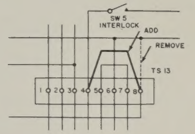
Figure 26. Functional diagram of FILAMENT POWER switch.

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
* *	* * *	* * *	
T9 (on order No. 3164)	TRANSFORMER, AF: modulation type; pri 21,000 ohms CT, secd 8000 ohms at 250 ma DC 7000 RMS test V; HS metal case; 7-5/32 in. h x 6-3/32 in. lg. x 5-9/32 in. wd less term; 250 w max; freq response 150 to 3000 CYC ± 2 bd; 5 screw type term on bottom of case; four 1/4-20 studs on 3-11/16 in. x 3 in. mtg/c; Hallicrafters part/dwg #55C202	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	

Page 135. Figure 66. Change the connection of the lead between terminal 11 of TS14 and the lower center connection, movable arm, of switch SW4, to go from terminal 11 of TS14 and the lower right hand connection, stationary contact, of switch SW4; as the schematic is in error.

Page 135. Figure 66. Make the following changes, as shown in the following partial schematic, on figure 66.


SW 5
INTERLOCK
ADD
REMOVE
TS 13
1 2 3 4 5 6 7 8

Page 135. Figure 66. Add figure 67 after figure 66.

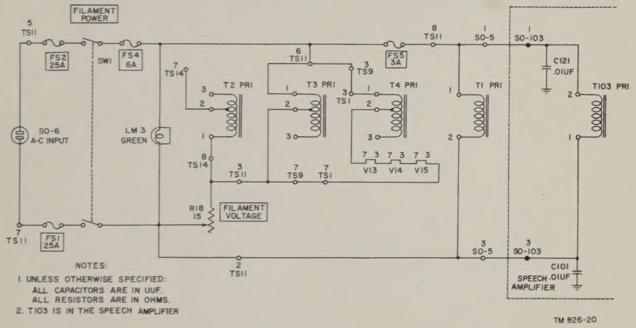

FILAMENT POWER
5 TSII
FS2 25A
SWI
FS4 6A
7 TS14
T2 PRI
6 TSII
3 TS9
T3 PRI
3 TSI
T4 PRI
FS5 3A
8 TSII
1 SO-5
1 SO-103
C121 .OIUF
T1 PRI
T103 PRI
SO-6 A-C INPUT
LM 3 GREEN
8 TS14
3 TSII
7 TS9
7 TSI
V13 V14 V15
R18 15
FILAMENT VOLTAGE
7 TSII
FS1 25A
2 TSII
3 SO-5
3 SO-103
C101 .OIUF
SPEECH AMPLIFIER
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.
2. T103 IS IN THE SPEECH AMPLIFIER
TM 826-20

Figure 26. Functional diagram of FILAMENT POWER switch.

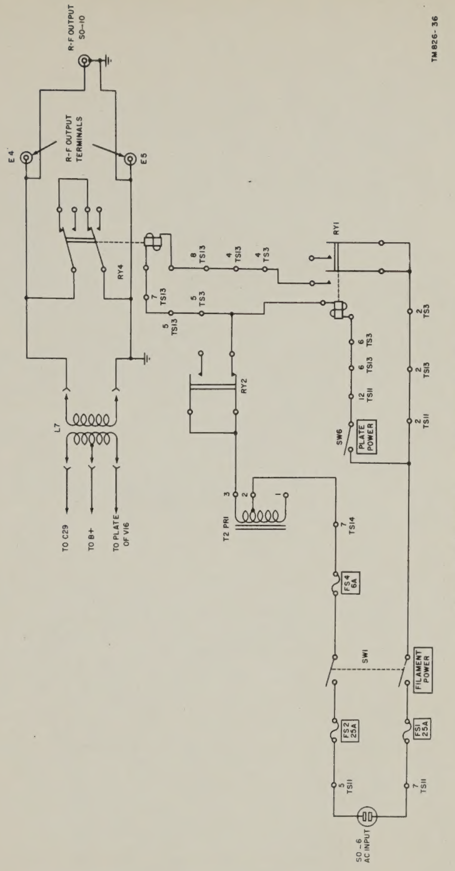

TM 826-36
R-F OUTPUT SO-10
E4
E5
R-F OUTPUT TERMINALS
RY4
L7
TO C29
TO B+
TO PLATE OF V16
RY1
RY2
T2 PRI
TS13
TS11
TS14
SW6
PLATE POWER
FS4 6A
SW1
FILAMENT POWER
FS2 25A
FS1 25A
SO-6 AC INPUT

Figure 36.1 Functional diagram of antenna-shorting relay RY4.

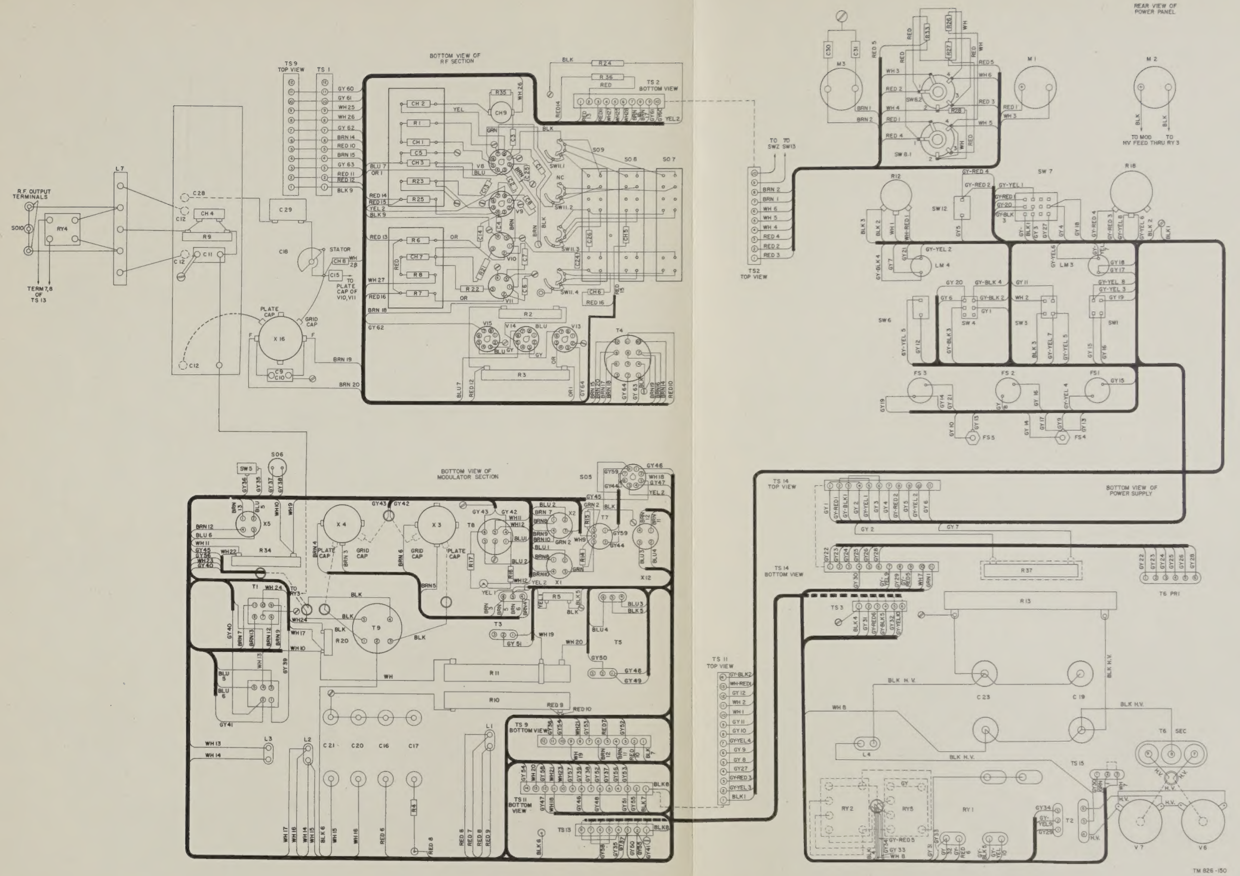
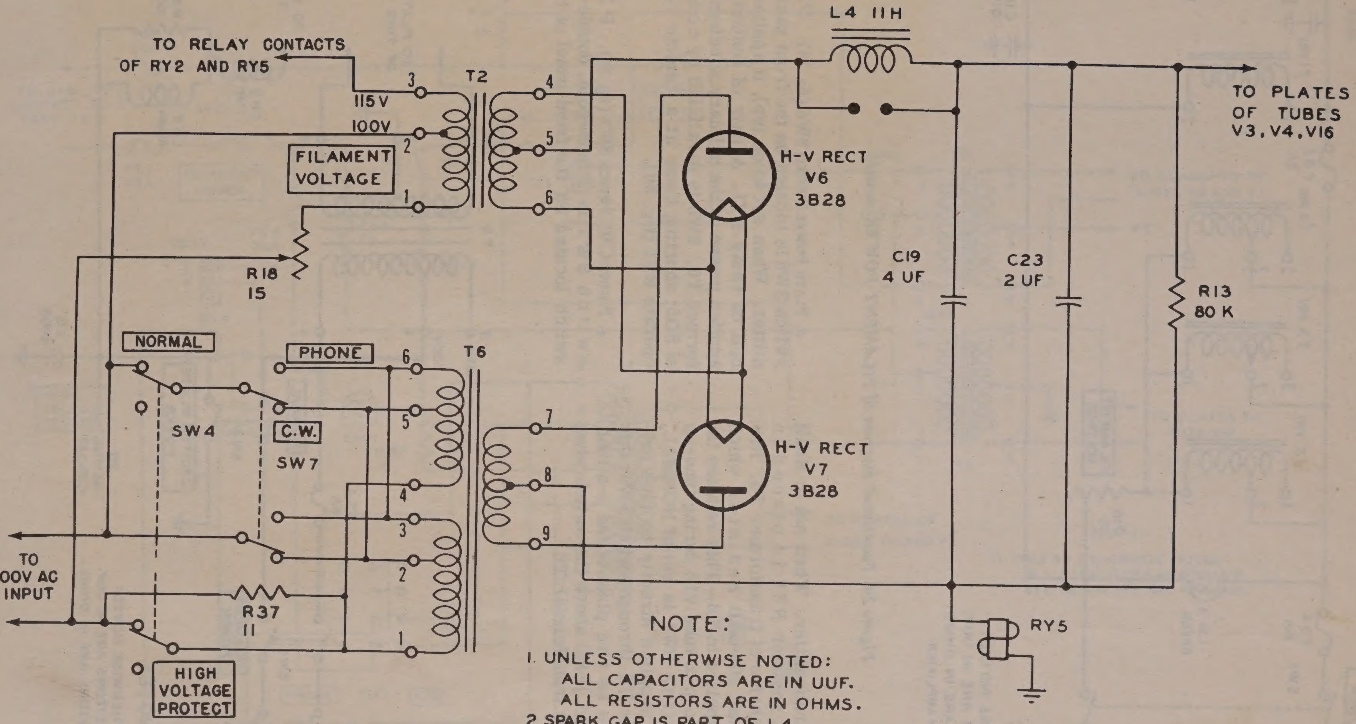

R-F OUTPUT TERMINALS
TERM 7,8 OF TS 13
TS5 TOP VIEW
BOTTOM VIEW OF R-F SECTION
TS2 BOTTOM VIEW
TS2 TOP VIEW
REAR VIEW OF POWER PANEL
TO MOD TO RY FEED THRU RY 3
BOTTOM VIEW OF MODULATOR SECTION
TS 14 TOP VIEW
TS 14 BOTTOM VIEW
TS 11 TOP VIEW
TS 9 BOTTOM VIEW
TS 6 BOTTOM VIEW
BOTTOM VIEW OF POWER SUPPLY
TS 15
RY 1
RY 2
RY 5
V 7
V 6
T2
TM 826-150

Figure 67. Practical wiring diagram for Radio Transmitter BC-610-I.


TO RELAY CONTACTS
OF RY2 AND RY5
T2
3
115V
100V
2
1
FILAMENT VOLTAGE
4
5
6
R18
15
L4 11H
H-V RECT
V6
3B28
H-V RECT
V7
3B28
C19
4 UF
C23
2 UF
R13
80 K
TO PLATES
OF TUBES
V3, V4, V16
NORMAL
SW4
PHONE
C.W.
SW7
T6
6
5
4
3
2
1
7
8
9
TO
100V AC
INPUT
R37
11
HIGH VOLTAGE PROTECT
RY5

NOTE:

1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.
2. SPARK GAP IS PART OF L4.

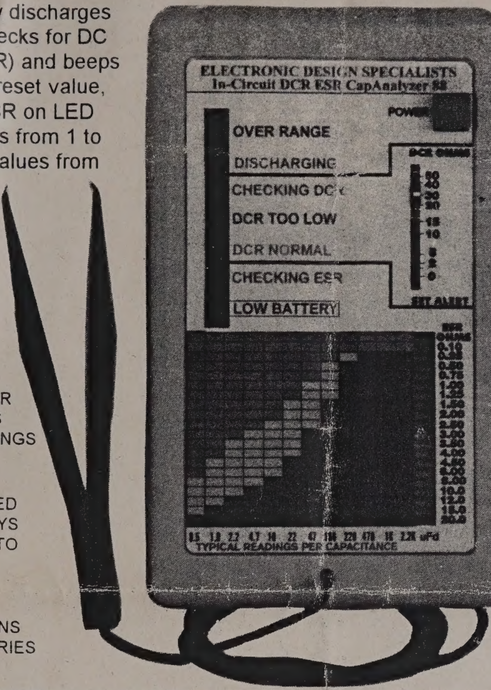
TM 826-19

Figure 25. Functional diagram of h-v power supply.

Check any Electrolytic Capacitor *In Circuit* with 100% Accuracy in 3 Seconds---GUARANTEED*

**60-day satisfaction or money-back gu*

Automatically discharges capacitor, checks for DC leakage (DCR) and beeps below your preset value, measures ESR on LED bar and beeps from 1 to 5 beeps for values from good to bad.



ONE-HANDED GOLD-PLATED TWEEZER PROBE

HANDY 3-COLOR CHART SHOWS TYPICAL READINGS

20 SEGMENT LED METER DISPLAYS ESR FROM 0.1 TO 20 OHMS

PORTABLE, RUNS ON AAA BATTERIES

Solving problems caused by electrolytics has n
easier. now that you can locate these bad capac
without having to unsolder them. and without s
time troubleshooting. by using the *CapAnalyze*

As a cap ages. it can cause problems in the pa
circuit it is in. In a TV vertical section. it can c
overlap or overscan problems. In the audio sec
cause distortion or low audio. In the syscon su
cause intermittent functions and mpu confusio
video circuits it can cause a fully scrambled pi
servo circuits. it can cause unstable speeds. Mo
and big screens also use surface mounted elect
the sound MPX decoder module and video PIP
convergence circuits. In camcorders they can c
problems in the servo. audio and video circuits

Measuring a cap in circuit is more difficult tha
measuring a resistor. because *circuit* resistance
capacitance can affect readings. Some "capacit
checkers" claim to work in circuit. but they giv
erroneous readings you have to unsolder and r
each one out of circuit anyway. Some of the m
expensive capacitor meters will not always me
capacitors accurately in circuit. Some meters m
capacitance at two different frequencies. and s
two different readings!

The trick to locating bad capacitors in circuit i
measure capacity at all. but instead. to measure its Equivalent Series Resistance (ESR) and DC Resistance (DCR). A perfect capac
measure as an open circuit at DC. and will show less resistance as the frequency across it increases. Most meters utilize this fact b
a cap's impedance at a fixed frequency such as 1KHz and translating the reading to capacity. In reality. checking a cap at 1KHz is
In television. and in PWM power supplies. frequencies of 100KHz and higher are used. It makes more sense to forget about measu
capacitance altogether. and use our knowledge that either DCR or ESR will change drastically in defective capacitors. The *CapAn*
the only device that will measure both DCR and ESR automatically.

Other ESR meters have their limitations: they don't check DCR for leaky or shorted caps and you must discharge each cap before
risk damage to the meter. Their test probes add their own capacitance. and readings vary depending on the position that the probe
Also. these meters usually don't use a frequency high enough to isolate the specific capacitor to be tested.

The *CapAnalyzer 88* uses a test frequency higher than the others. automatically discharges the cap under test. checks DCR. whic
preset the value to beep a warning at. then checks and displays ESR on a 20 segment LED bar scale. and beeps from one to five be
depending on the ESR condition of the cap. Both DCR and ESR measurements are under 50 millivolts so that no active devices ar
mistakenly turned on. Because it checks DCR first. it will alert the technician *immediately* if the cap or anything else in that circu
or leaky. before it checks ESR. It includes a low-capacitance one-handed tweezer test probe for accuracy and ease-of-use. Because
microprocessor controlled. it has more features and is much more accurate than the older designs. A three-color chart on the front
shows typical ESR readings of good and bad caps depending on their capacitance.

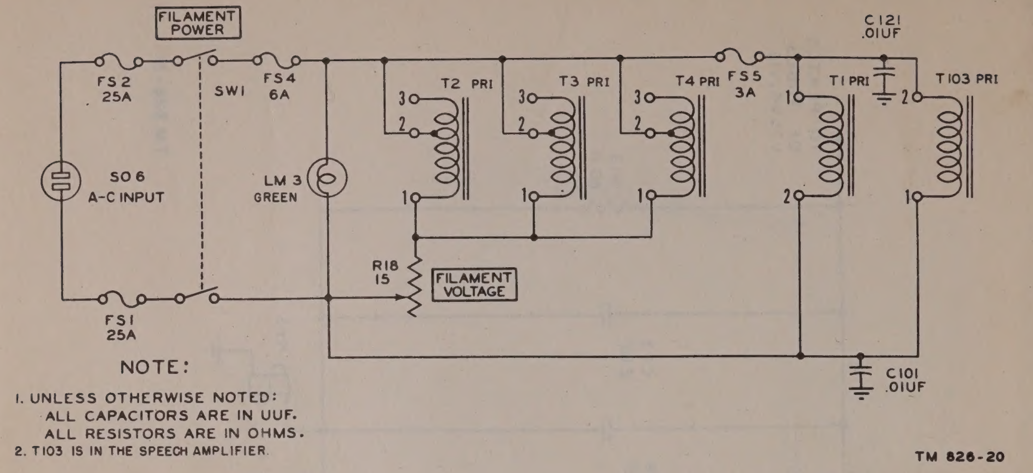
So make your job easier. and get your own *CapAnalyzer 88*. Or don't. How much is your time worth?

ELECTRONIC DESIGN SPECIALISTS, INC. **we make test equipment designed to make you money.**

Nationally Distributed by

PRINT™
Products International

8931 Brookville Rd. • Silver Spring, MD 20910 U.S.A.
(800) 638-2020 (301) 587-7824 FAX: (800) 545-0058


FILAMENT POWER
FS2 25A
SW1
FS4 6A
SO6 A-C INPUT
LM3 GREEN
T2 PRI
T3 PRI
T4 PRI
FS5 3A
T1 PRI
C121 .01UF
T103 PRI
R18 15
FILAMENT VOLTAGE
FS1 25A
C101 .01UF
TM 826-20

NOTE:

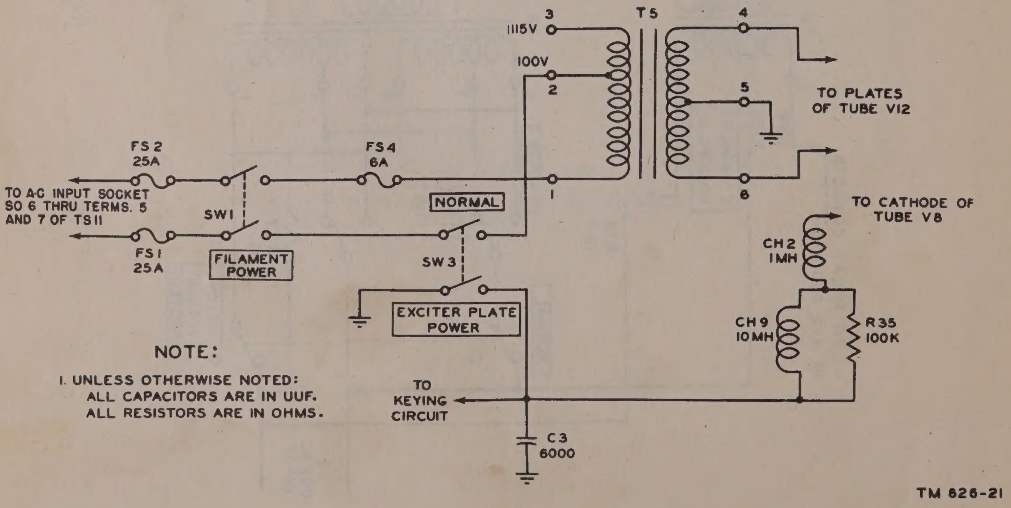
1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.
2. T103 IS IN THE SPEECH AMPLIFIER.

Figure 26. Functional diagram of FILAMENT POWER switch.

front panel of the transmitter. When set to HIGH VOLTAGE PROTECT, resistor R37 is placed in series with the primaries of transformer T6. Resistor R37 is an 11-ohm, 300-watt resistor which reduces the voltage applied to T6. This reduces the plate voltage applied to p-a tube V16 during tune-up operations. When switch SW4 is set at NORMAL, alternating current is supplied directly to the primaries of transformer T6 through switch SW4; this applies full voltage to the plate of the p-a tube. Lamp LM4 lights a red jewel above the switch when power is applied to h-v transformer T6.

d. Plate Power Switch SW6 (fig. 28). PLATE POWER switch SW6 is located on the front panel of the transmitter. When set to on (up), it applies voltage to the coil of relay RY1. A pair of contacts on relay RY1 applies power to the primary windings of h-v transformer T6. SW6 is paralleled by contacts 3 and 4 of SO5; shorting these at a remote location will operate RY1 (fig. 66).

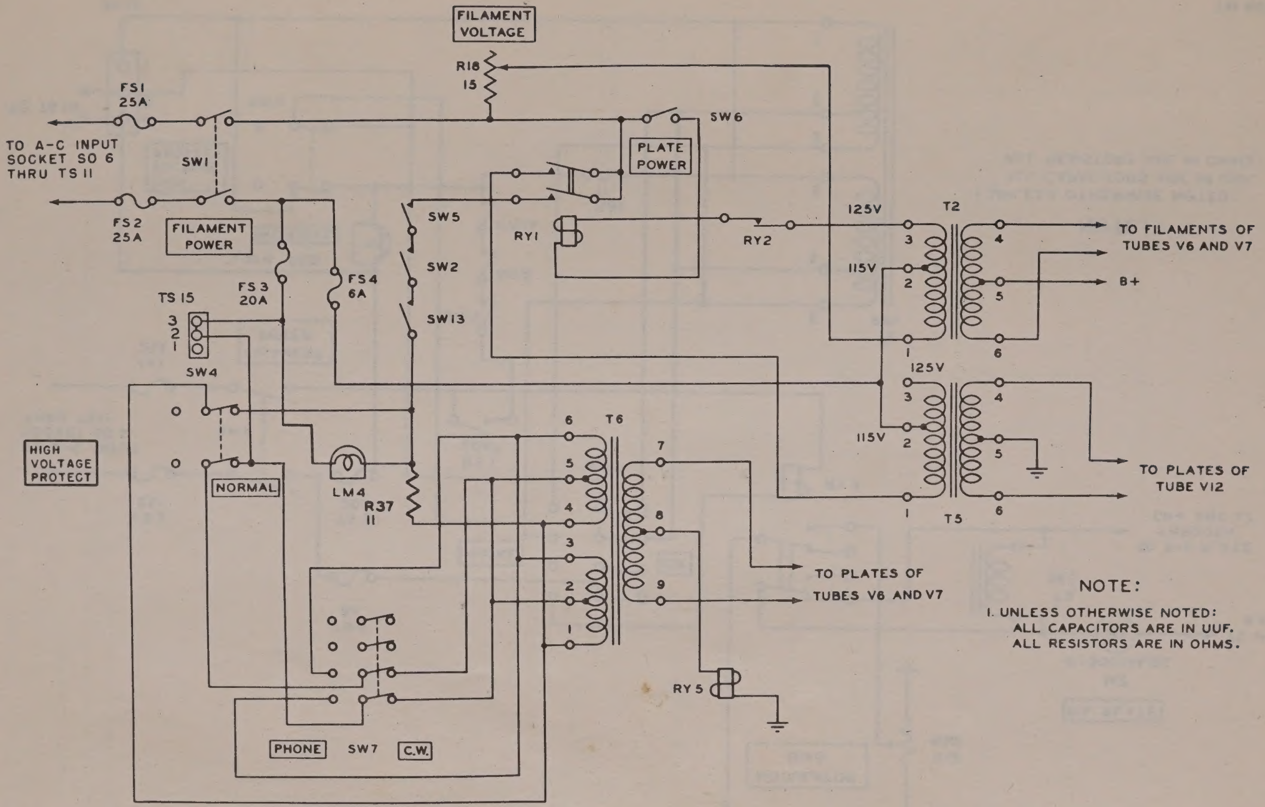
e. Phone-C.W. Switch SW7 (fig. 29). PHONE-C.W. switch SW7 is a four-pole, double-throw toggle switch located on the front panel of the transmitter.


3
T5
4
115V
100V
2
5
TO PLATES OF TUBE V12
FS2 25A
FS4 6A
1
6
TO A-C INPUT SOCKET SO 6 THRU TERMS. 5 AND 7 OF TS11
SW1
NORMAL
TO CATHODE OF TUBE V8
FS1 25A
FILAMENT POWER
SW3
CH2 1MH
EXCITER PLATE POWER
CH9 10MH
R35 100K
TO KEYING CIRCUIT
C3 6000
TM 826-21

NOTE:

1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.

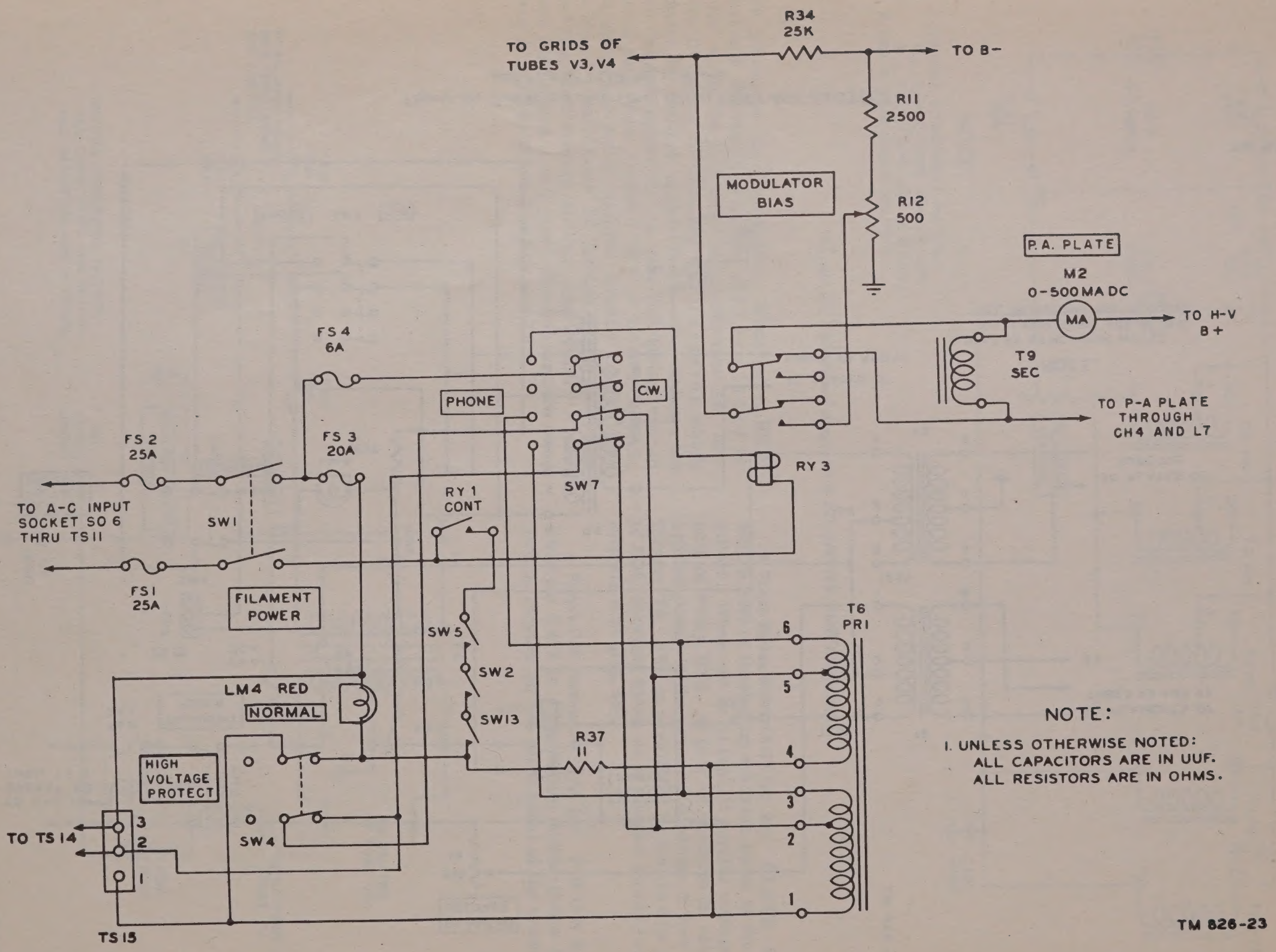
Figure 27. Functional diagram of EXCITER PLATE POWER switch.


FILAMENT VOLTAGE
R18
15
FS1
25A
SW6
TO A-C INPUT SOCKET SO 6 THRU TS 11
SW1
PLATE POWER
FS2
25A
FILAMENT POWER
SW5
RY1
RY2
125V
T2
3
4
TO FILAMENTS OF TUBES V6 AND V7
115V
2
5
B+
SW2
FS3
20A
FS4
6A
SW13
TS 15
3
2
1
1
6
125V
SW4
3
4
6
T6
115V
2
HIGH VOLTAGE PROTECT
7
5
5
TO PLATES OF TUBE V12
NORMAL
LM4
R37
11
4
8
1
T5
6
3
TO PLATES OF TUBES V6 AND V7
2
9
1
RY5
PHONE
SW7
C.W.

NOTE:

1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

Figure 28. Functional diagram of HIGH VOLTAGE PROTECT and PLATE POWER switches.

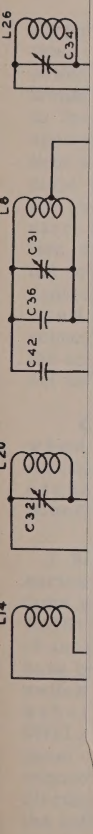

TO GRIDS OF TUBES V3, V4
R34 25K
TO B-
R11 2500
MODULATOR BIAS
R12 500
P.A. PLATE
M2 0-500 MA DC
MA
TO H-V B+
T9 SEC
TO P-A PLATE THROUGH CH4 AND L7
FS 4 6A
PHONE
C.W.
RY 3
FS 2 25A
FS 3 20A
SW 7
TO A-C INPUT SOCKET SO 6 THRU TS11
SW1
RY 1 CONT
FS1 25A
FILAMENT POWER
T6 PRI
6
5
4
3
2
1
SW 5
SW 2
SW13
LM4 RED
NORMAL
R37 11
HIGH VOLTAGE PROTECT
SW 4
TO TS 14
3
2
1
TS15

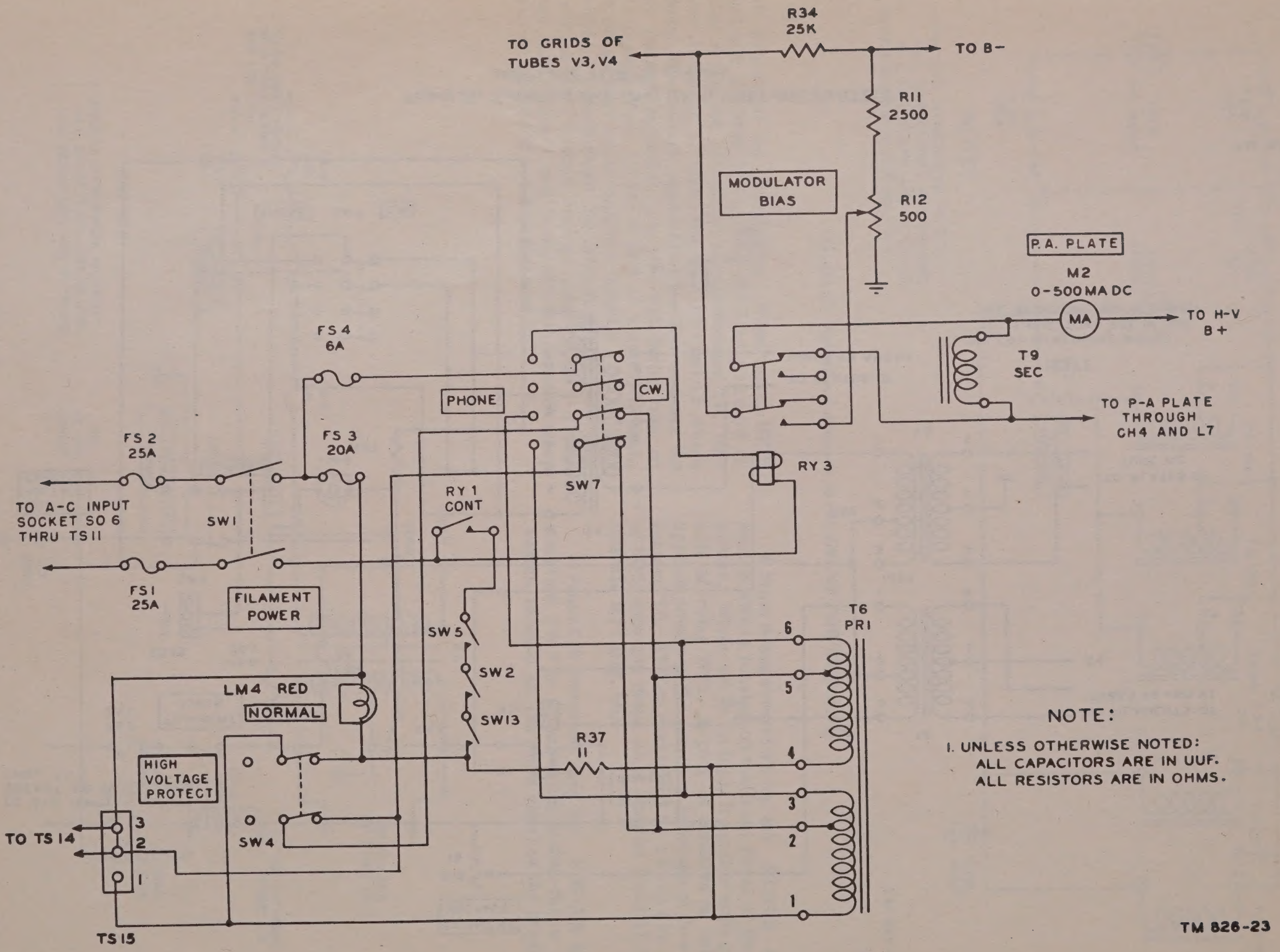
NOTE:

1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.

TM 826-23

Figure 29. Functional diagram of PHONE-C.W. switch.


L26
C34
L8
C31
C36
C42
L20
C32
L14


R34
25K
TO GRIDS OF
TUBES V3, V4
TO B−
R11
2500
MODULATOR
BIAS
R12
500
P.A. PLATE
M2
0-500 MA DC
MA
TO H-V
B+
T9
SEC
TO P-A PLATE
THROUGH
CH4 AND L7
FS 4
6A
PHONE
C.W.
FS 2
25A
FS 3
20A
SW7
RY 3
RY 1
CONT
TO A-C INPUT
SOCKET SO 6
THRU TS11
SW1
FS1
25A
FILAMENT
POWER
T6
PRI
6
5
4
3
2
1
SW 5
SW 2
SW13
LM4 RED
NORMAL
R37
11
HIGH
VOLTAGE
PROTECT
SW 4
TO TS 14
3
2
1
TS15
TM 826-23

NOTE:

1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

Figure 29. Functional diagram of PHONE-C.W. switch.

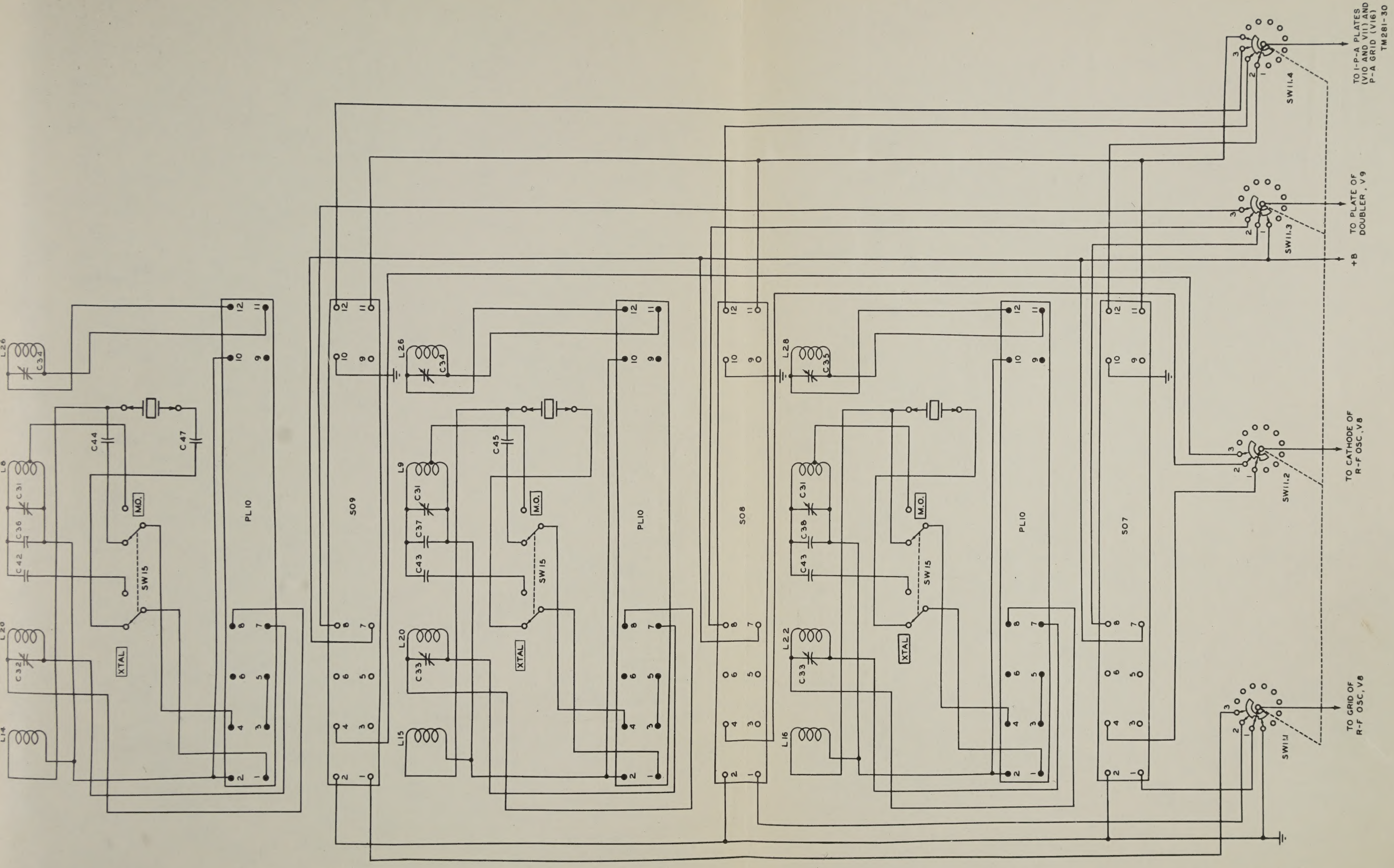
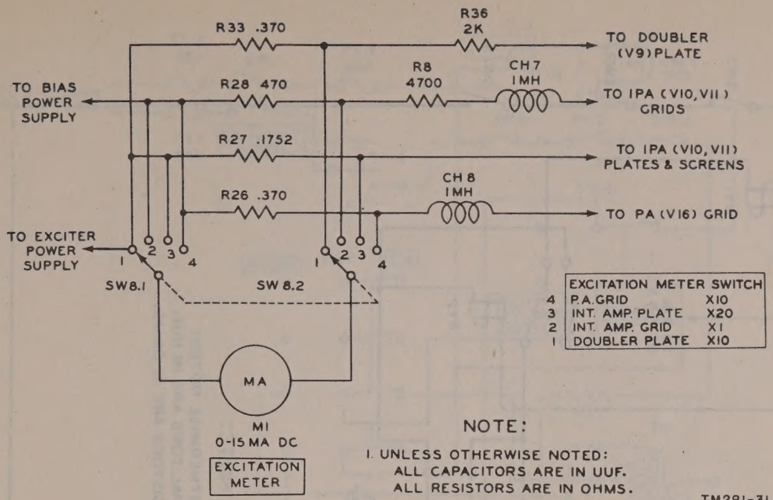

L26
C34
L8
C31
C36
C42
L20
C32
L14
C44
C47
M.O.
SW15
XTAL
PL10
SO9
L26
C34
L9
C31
C37
C43
C45
L20
C33
L15
SO8
L28
C35
L22
C38
C43
C33
L16
SO7
SW11.4
SW11.3
SW11.2
SW11.1
TO I-P-A PLATES (V10 AND V11) AND P-A GRID (V16)
TM281-30
TO PLATE OF DOUBLER, V9
+B
TO CATHODE OF R-F OSC, V8
TO GRID OF R-F OSC, V8

Figure 30. Functional diagram of BAND SWITCH SW11.



NOTE:

1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM281-31

Figure 31. Functional diagram of EXCITATION METER switch.

Its purpose is to select either c-w or phone operation. In the C.W. position, switch SW7 applies a-c power to only a portion of the primary windings of transformer T6. Thus, full plate voltage is applied to the p-a tube. In the PHONE position, switch SW7 applies a-c power across the entire primary windings of transformer T6 and, as a result, reduced plate voltage is applied to p-a tube V16 and modulator tubes V3 and V4. Two paralleled poles of SW7 carry the T6 primary current. In the PHONE position, another pole on switch SW7 applies voltage to the coil of relay RY3. In the C.W. position, the contacts on relay RY3 short-circuit the secondary winding of modulation transformer T9, and these contacts remain closed until current flows through the coil of relay RY3. One pole on switch SW7 is not used.

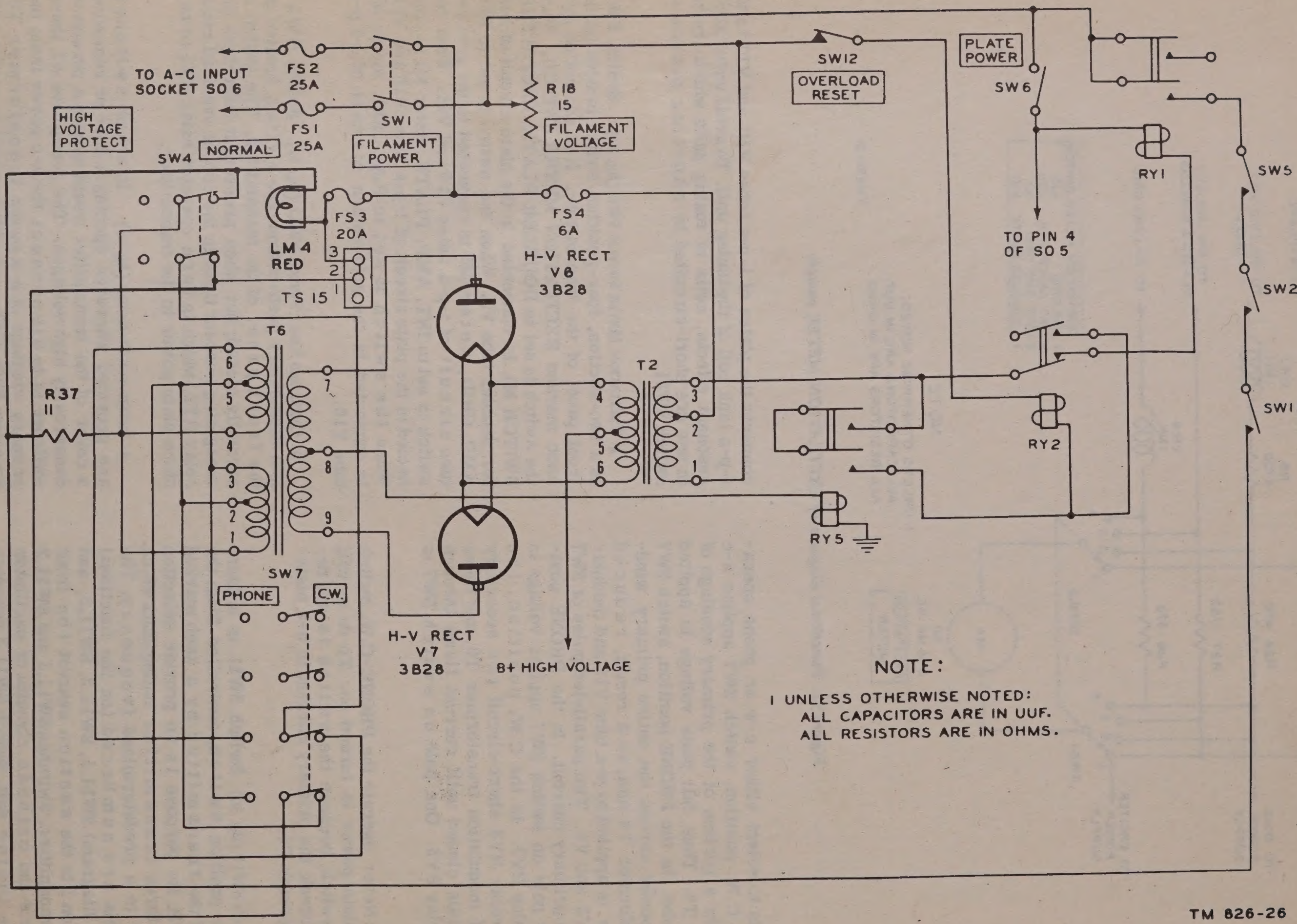
Caution: Never operate the PHONE-C.W. switch when the plate power is turned on. To do so will damage the switch, because the switch is not designed to break the primary current to h-v plate-power transformer T6.

f. Band Switch SW11 (fig. 30). Switch SW11 is a four-section, three-position switch, controlled from the front panel of the transmitter by a knob marked BAND SWITCH. Its purpose is to provide selection of any one of three transmitter tuning units which have been set to a predetermined frequency. The switch sections are numbered (on the functional schematic diagram) SW11.1, SW11.2, SW11.3, and SW11.4. Section I is the section nearest the front panel of the transmitter. Switches SW11.1 and SW11.2 connect the grid and cathode circuits of oscillator circuits in the tuning unit. Switch SW11.3 connects the buffer-doubler tank coil of the tuning unit to the plate of buffer-doubler tube V9. Switch SW11.4 connects the plates of i-p-a tubes V10 and V11 to the i-p-a tank coil of the tuning unit. To avoid undesirable resonant effects, coils of tuning units which are not in use are short-circuited by shorting plates on switch SW11.

g. Excitation Meter Switch SW8 (fig. 31). Switch SW8 is a two-section, four-position switch located on the front panel of the transmitter. It is controlled by a knob marked EXCITATION METER SWITCH. When the switch is set to DOUBLER PLATE, EXCITATION SWITCH M1 is connected in the plate circuit of buffer-doubler tube V9. When the switch is set to INT. AMP. GRID, meter M1 is connected in the grid return circuit of i-p-a tubes V10 and V11. When the switch is set to INT. AMP. PLATE, meter M1 is connected in the plate circuit of i-p-a tubes V10 and V11. When the switch is set to P.A. GRID, meter M1 is connected in the grid return circuit of r-f p-a tube V16.

h. Overload Reset Switch SW12 (fig. 32). Switch SW12 is a momentary push-button type switch located on the front panel of the transmitter. The switch is normally closed; but when pressed, it interrupts the energizing current through the coil of overload reset relay RY2, which in turn operates relay RY1 to restore plate power to the transmitter.

i. Interlock Switches (fig. 33) Interlock switches are provided wherever opening a door or removing a cover of the transmitter would expose a person to dangerously high voltages. The purpose of these switches is to disconnect the a-c power from the primary windings of h-v power transformer T6. Switches SW2, SW5, and SW13 are all in series with each other and also in series with one pair of contacts on relay RY1. These switches provide protec-


TO A-C INPUT SOCKET SO 6
FS 2
25A
FS 1
25A
SW 1
FILAMENT POWER
R 18
15
FILAMENT VOLTAGE
SW 12
OVERLOAD RESET
PLATE POWER
SW 6
RY 1
SW 5
SW 2
SW 13
TO PIN 4 OF SO 5
HIGH VOLTAGE PROTECT
NORMAL
SW 4
LM 4
RED
FS 3
20A
FS 4
6A
TS 15
3
2
1
H-V RECT
V 6
3B28
T 6
6
5
4
3
2
1
7
8
9
T 2
4
5
6
3
2
1
RY 2
RY 5
R 37
11
SW 7
PHONE
C.W.
H-V RECT
V 7
3B28
B+ HIGH VOLTAGE

NOTE:

1 UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM 826-26

Figure 32. Functional diagram of OVERLOAD RESET switch.

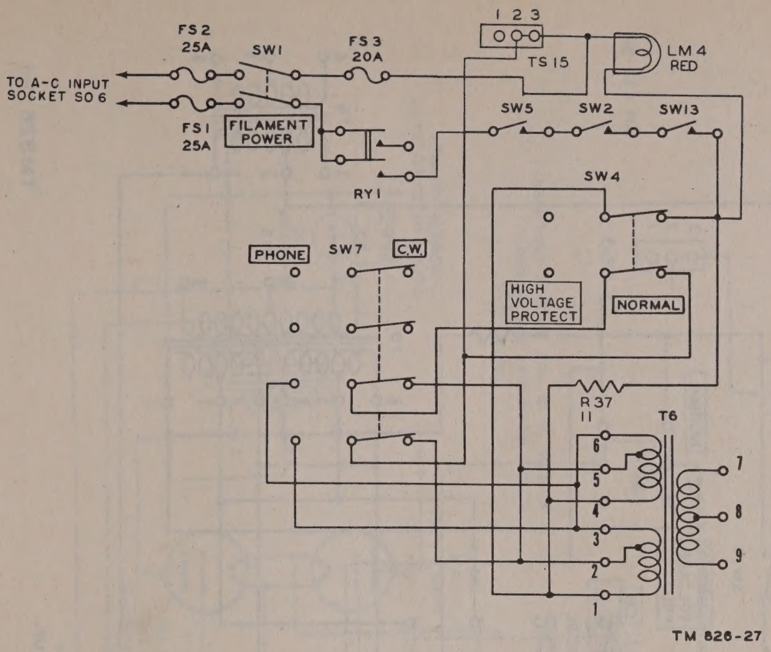


Figure 33. Functional diagram of interlock switches.

tion against the h-v rectifier voltages even if the contacts of relay RY1 should freeze closed. Switch SW2 is located on the under side of the left-hand top cover just above the r-f p-a tank coil. Switch SW5 is located on the rear apron of the modulator deck chassis in such a manner that the switch opens whenever the back cover is removed. Switch SW13 is located on the under side of the right-hand top cover and operates whenever the door over the tuning units is opened.

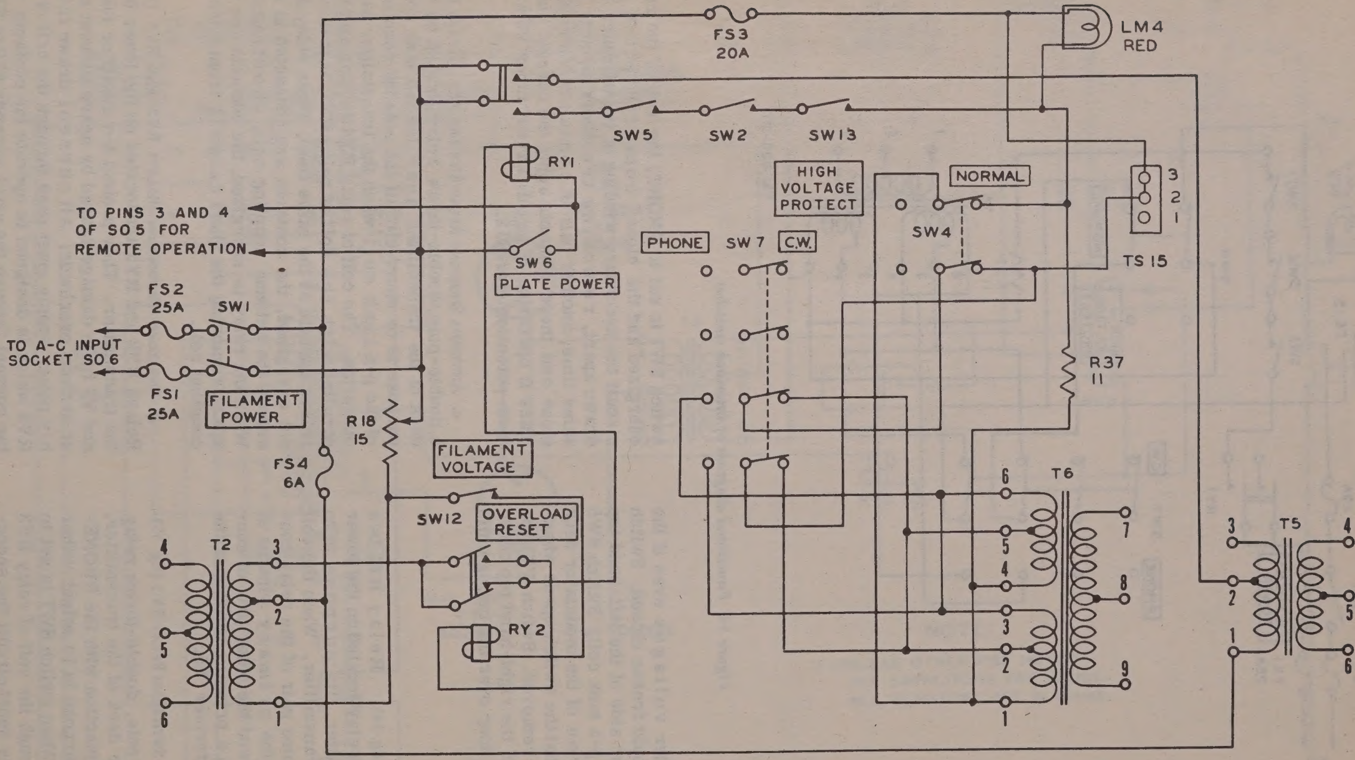
50. Relays

a. Plate Power Relay RY1 (fig. 34). Relay RY1 is a double-pole, single-throw relay located on the power supply deck of the transmitter. Its purpose is to apply plate power to the transmitter. When the coil of relay RY1 is energized, one pair of the relay contacts applies a-c power to the primary winding of h-v power transformer T6 and the other pair of contacts apply a-c power to the primary winding of the exciter power supply transformer T5.

b. Phone-Continuous Wave Switching Relay RY3 (fig. 35). Relay RY3 is a double-pole, double-throw relay located on the modulator deck of the transmitter. This relay operates in conjunction with the PHONE-C.W. switch SW7 and its purpose is to select either c-w or phone operation. When switch SW7 is set to C.W. no current flows through the coil of relay RY3 and a closed pair of contacts short circuit the secondary winding of modulation transformer T9. When switch SW7 is set to PHONE, the coil of the relay is energized and the closed contacts which short-circuit the secondary winding of transformer T9 are drawn apart, removing the short circuit. At the same time, another pair of contacts on relay RY3 close and these contacts apply the correct bias, for class B operation of modulator tubes V3 and V4, from potentiometer R12.

c. Antenna Shorting Relay RY4 (fig. 36). Relay RY4 is a double-pole, double-throw relay located on the r-f deck of the transmitter near the p-a tank coil. Its purpose is to short-circuit the antenna coupling coil of the p-a tank coil when the transmitter is not in operation. The coil of relay RY4 is connected in parallel with the coil of relay RY1; therefore both relays operate at the same time. When relay RY4 is not energized, the contacts are connected in series across the antenna coupling coil, shorting it out. When the relay is energized, the contacts are drawn apart, removing the short circuit from across the coupling coil.

d. Overload Protection Relays RY2 and RY5 (fig. 32). Relays RY2 and RY5 are located on the lower deck of the transmitter. They protect h-v rectifier tubes V6 and V7 from damage caused by heavy current surges or serious overloads. All current drawn from the h-v power supply must pass through the coil of relay RY5 which is designed to operate the contacts when the current through the coil exceeds 670 to 710 ma. When the contacts on relay RY5 close, relay RY2 is


FS3
20A
LM4
RED
SW5
SW2
SW13
RY1
HIGH
VOLTAGE
PROTECT
NORMAL
3
2
1
TO PINS 3 AND 4
OF SO5 FOR
REMOTE OPERATION
PHONE
SW7
C.W.
SW4
TS15
SW6
PLATE POWER
FS2
25A
SW1
TO A-C INPUT
SOCKET SO6
FS1
25A
FILAMENT
POWER
R18
15
R37
11
FILAMENT
VOLTAGE
FS4
6A
SW12
OVERLOAD
RESET
T2
4
5
6
3
2
1
RY2
T6
6
5
4
3
2
1
7
8
9
T5
3
2
1
4
5
6

NOTE:

1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.

TM826-28

Figure 34. Functional diagram of plate power relay RY1.

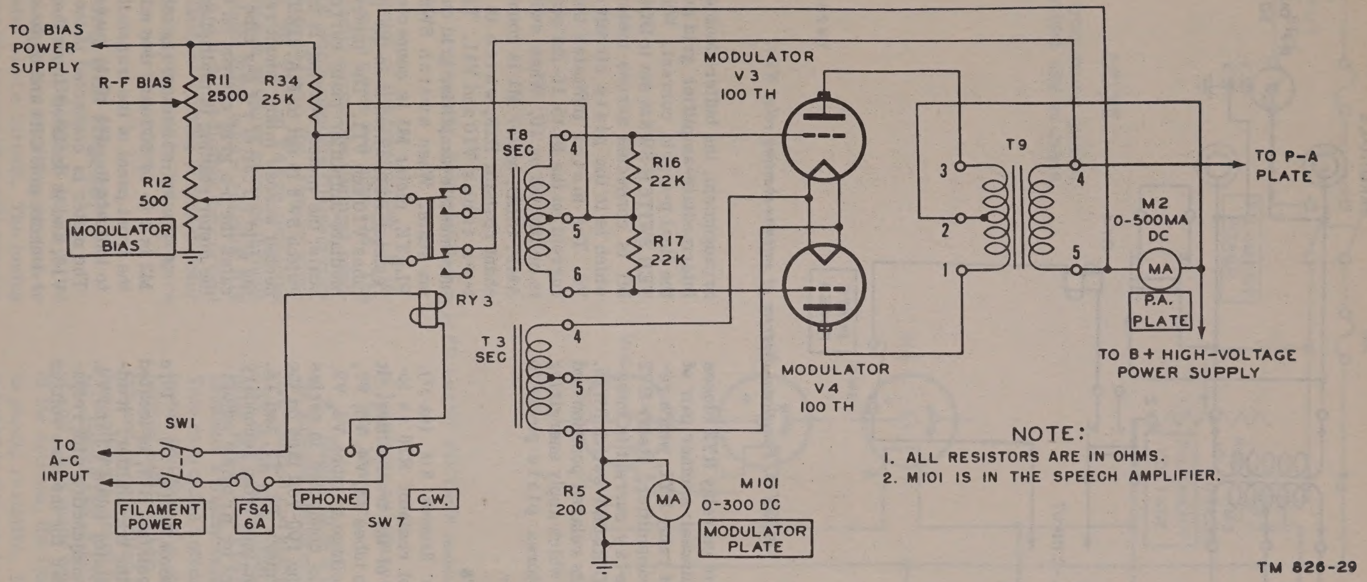

TO BIAS POWER SUPPLY
R-F BIAS
R11 2500
R34 25K
R12 500
MODULATOR BIAS
T8 SEC
4
5
6
R16 22K
R17 22K
RY 3
T 3 SEC
4
5
6
MODULATOR V 3 100 TH
MODULATOR V 4 100 TH
T9
3
2
1
4
5
TO P-A PLATE
M2 0-500MA DC
MA
P.A. PLATE
TO B + HIGH-VOLTAGE POWER SUPPLY
SW1
TO A-C INPUT
FILAMENT POWER
FS4 6A
PHONE
C.W.
SW7
R5 200
MA
M101 0-300 DC
MODULATOR PLATE
NOTE:
1. ALL RESISTORS ARE IN OHMS.
2. M101 IS IN THE SPEECH AMPLIFIER.
TM 826-29

Figure 35. Functional diagram phone-c-w switching relay RY3.

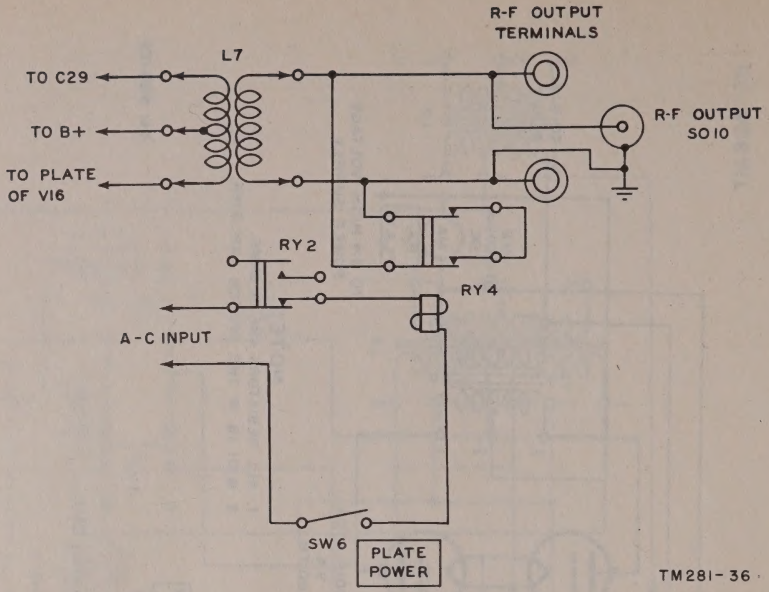


Figure 36. Functional diagram of antenna-shorting relay RY4.

energized. One pair of contacts on relay RY2 closes and maintains the energizing current; another pair of contacts opens the circuit of relay RY1, which removes plate power from the transmitter. Relay RY2 remains energized until the relay current is interrupted by pressing OVERLOAD RESET switch SW15. The armature then returns to its relaxed position and closes the pair of contacts which apply energizing current to relay RY1; this restores plate power to the transmitter.

51. Controls and Meters

a. FILAMENT VOLTAGE CONTROL RESISTOR R18 (fig. 37). FILAMENT VOLTAGE control resistor R18 is located on the lower front panel of the transmitter. It controls the filament voltage to tubes V3, V4, V6, V7, V12, and V16 and the heater voltage to tubes V8, V9, V10, and V11. Resistor R18 is connected in series with the line voltage and the 100-volt taps on the primary windings of transformers T2, T3, and T4. Correct filament voltage is obtained from secondary windings on these transformers by proper adjustment of the primary voltage.

b. MODULATOR BIAS CONTROL RESISTOR R12 (fig. 22). The MODULATOR BIAS control resistor, R12, is located on the lower front panel of the transmitter. It adjusts the bias voltage to modulator tubes V3 and V4. Resistor R12 also serves in conjunction with resistor R11 as a bleeder resistor for the bias voltage power supply.

c. EXCITATION METER M1 (fig. 31). The excitation meter indicates through a suitable switching arrangement, the buffer-doubler plate current, the intermediate-amplifier grid and plate currents, and the final p-a grid current. When EXCITATION METER SWITCH SW8 is set to DOUBLER PLATE, meter M1 is connected across meter shunt resistor, R33, which is in the plate circuit of buffer-doubler tube V9. The meter indicates the buffer-doubler plate current on the 0- to 15-ma scale; the meter reading is multiplied by 10. When switch SW8 is set to INT. AMP. GRID, meter M1 is connected across meter shunt resistor R28, which is in the grid circuit of i-p-a tubes V10 and V11. The meter indicates the intermediate-amplifier grid current on the 0- to 15-ma scale. When switch SW8 is set to INT. AMP. PLATE, meter M1 is connected across meter shunt resistor R27, which is in the plate circuit of i-p-a tubes V10 and V11. The meter indicates the intermediate-amplifier plate current on the 0- to 15-ma scale; the meter reading is multiplied by 20. When switch SW8 is set to P.A. GRID, meter M1 is connected across meter shunt resistor R26 which is in the grid circuit of r-f p-a tube V16. The meter indicates the p-a grid current on the 0- to 15-ma scale; the meter reading is multiplied by 10.

d. P.A. PLATE METER M2 (fig. 35). P.A. PLATE meter M2 is a 0- to 500-ma, d-c milliammeter located on the front panel of the transmitter. Its purpose is to indicate the d-c plate current of p-a tube V16. The meter is connected in the h-v plate lead to tube V16, and is isolated from the r-f in the tank coil by r-f choke coil CH4 and bypass capacitor C11.

e. FILAMENT VOLTAGE METER M3 (fig. 21). Filament voltage meter M3 is a 0- to 10-volt a-c voltmeter

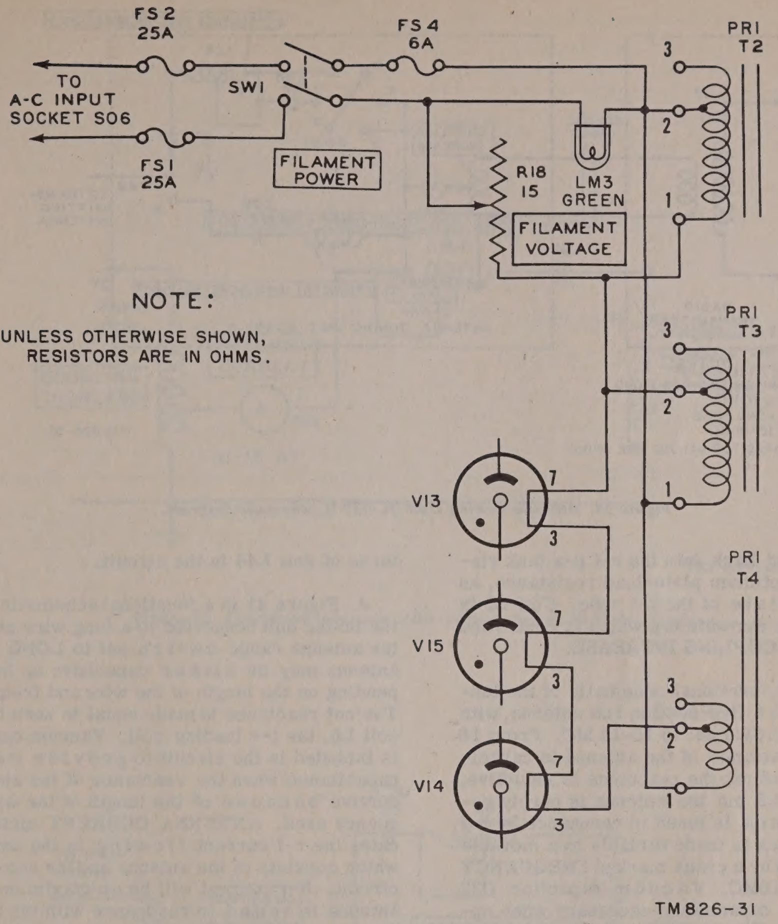


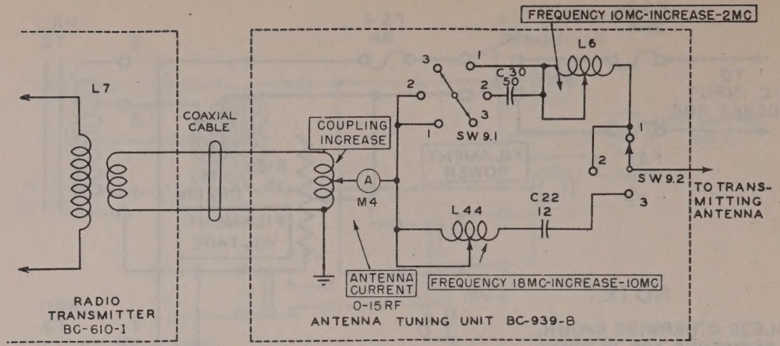
Figure 37. Functional diagram of FILAMENT VOLTAGE control R18.

located on the front panel of the transmitter. It indicates the filament voltage to p-a tube V16. The meter is connected directly across the filament winding of transformer T4 which supplies filament current to r-f p-a tube V16. Since the primary windings of transformers T2, T3, and T4 are connected in parallel and receive a-c primary current through common variable resistor R18, when resistor R18 is adjusted so that meter M3 indicates the correct voltage across the filament winding of transformer T4, the filament voltages supplied by transformers T2, and T3 will also be nearly correct.

52. Antenna Tuning Unit (fig. 38)

a. Antenna Tuning Unit BC-939-B is used to match the impedance of the transmitting antenna to that of the final p-a tube plate circuit. The tuning unit is so designed that the transmitter will operate satisfactorily with a five-section rod antenna or with a long wire auxiliary antenna over a frequency range of 2 to 18 mc.

b. Figure 39 is a functional schematic drawing of the antenna tuning unit when it is connected to a five-section rod antenna and antenna range switch SW9 is set to 2-10 MC. Since the antenna is electrically much shorter than a quarter-wavelength, it presents a highly capacitive load to the transmitter. This capacitive antenna can be tuned to resonance by the addition of a portion of inductance L6, the l-f loading coil, which is made variable by a movable tap and is controlled from the front panel of the tuning unit by a crank handle marked FREQUENCY 10 MC-INCREASE-2 MC. When the inductive reactance of coil L6 is made equal to the capacitive reactance of the antenna, the load presented to the transmitter is purely resistive. Coupling coil L6, which is link-coupled to the p-a tank coil, acts as an impedance-matching transformer so that the resistance of the


FREQUENCY 10MC-INCREASE-2MC
L6
3
1
C30
50
2
2
3
L7
COAXIAL CABLE
COUPLING INCREASE
1
SW 9.1
1
2
SW 9.2
TO TRANSMITTING ANTENNA
A
M4
C22
12
L44
3
ANTENNA CURRENT
0-15RF
FREQUENCY 18MC-INCREASE-10MC
RADIO TRANSMITTER BC-610-1
ANTENNA TUNING UNIT BC-939-B

NOTES:
1. SWITCH SW9 POSITIONS
   1. 2-10 MC
   2. LONG WIRE
   3. 10-18 MC
2. CAPACITOR VALUES ARE IN UUF.

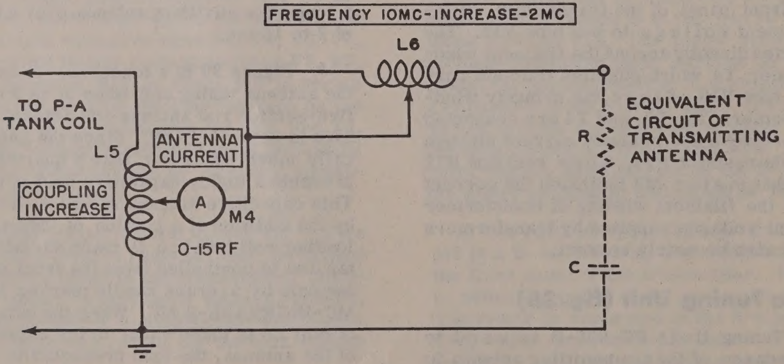
TM 826-59

Figure 38. Antenna Tuning Unit BC-939-B, schematic diagram.

antenna, as reflected back into the r-f p-a tank circuit, presents the optimum plate-load resistance, as viewed from the plate of the p-a tube. Coil L5 is made variable by a movable tap which is controlled by a knob marked COUPLING INCREASE.

c. Figure 40 is a functional schematic of the tuning unit connected to a five-section rod antenna, with antenna range switch SW9 set to 10-18 MC. From 10 to 12.5 mc, the reactance of the antenna is capacitive; from 12.5 to 18 mc the reactance is inductive. At approximately 12.5 mc the antenna is purely resistive. The antenna is tuned to resonance by h-f loading coil L44 which is made variable by a movable tap and is controlled by a crank marked FREQUENCY 18 MC-INCREASE-10MC. Vacuum capacitor C22 provides the added capacitance necessary when operating from 12.5 to 18 mc. Its effect is neutralized when operating from 10 to 12.5 mc by including more turns of coil L44 in the circuit.

d. Figure 41 is a functional schematic diagram of the tuning unit connected to a long wire antenna, with the antenna range switch set to LONG WIRE. The antenna may be either capacitive or inductive depending on the length of the wire and frequency used. The net reactance is made equal to zero by adjusting coil L6, the l-v loading coil. Vacuum capacitor C30 is included in the circuit to provide the necessary capacitance when the reactance of the antenna is inductive because of the length of the wire and frequency used. ANTENNA CURRENT meter M4 indicates the r-f current flowing in the series circuit which consists of the antenna and the antenna loading circuit. R-f current will be at maximum when the antenna is tuned to resonance with the transmitter frequency by means of the antenna tuning circuit in the antenna tuning unit.


FREQUENCY 10MC-INCREASE-2MC
L6
TO P-A TANK COIL
L5
ANTENNA CURRENT
COUPLING INCREASE
A
M4
0-15RF
EQUIVALENT CIRCUIT OF TRANSMITTING ANTENNA
R
C

TM 826-60

Figure 39. Functional schematic with range switch in 2-10 MC position.

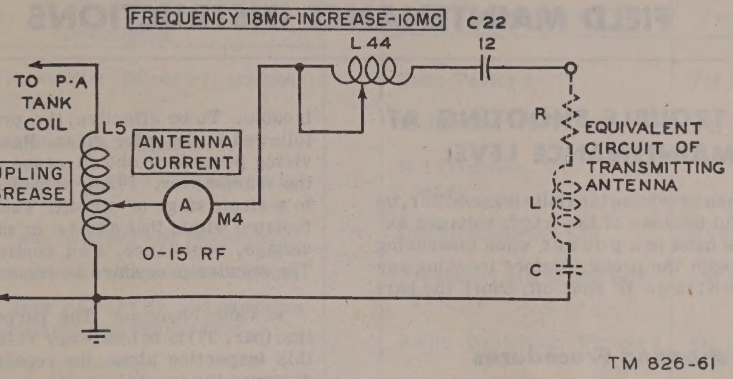

FREQUENCY 18MC-INCREASE-10MC
C22
12
L44
TO P-A
TANK
COIL
L5
ANTENNA
CURRENT
COUPLING
INCREASE
A
M4
0-15 RF
R
EQUIVALENT
CIRCUIT OF
TRANSMITTING
ANTENNA
L
C
TM 826-61

Figure 40. Functional schematic with range switch in 10-18 MC position.

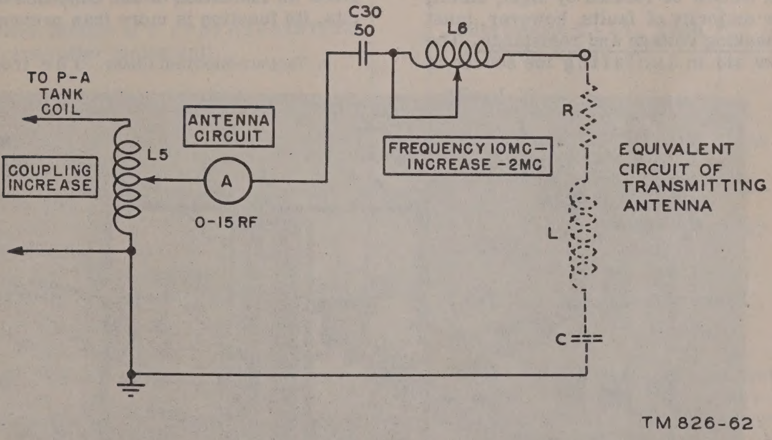

C30
50
L6
TO P-A
TANK
COIL
ANTENNA
CIRCUIT
L5
COUPLING
INCREASE
A
0-15 RF
FREQUENCY 10MC—
INCREASE -2MC
R
EQUIVALENT
CIRCUIT OF
TRANSMITTING
ANTENNA
L
C
TM 826-62

Figure 41. Functional schematic with range switch in LONG WIRE position.

CHAPTER 6
FIELD MAINTENANCE INSTRUCTIONS

Section I. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

WARNING: When servicing the radio transmitter, be extremely careful because of the high voltages exposed. Keep one hand in a pocket when measuring socket voltages with the probe. Before touching any part after the voltage is shut off, short the part to ground.

53. Trouble-shooting Procedures

The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the major component or circuit responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by checking voltage and resistance. The items listed below aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. Remember that the servicing procedure should cause no forther damage to the transmitter. First, trouble should be localized to a single stage or circuit. Then the trouble may be isolated within that stage or circuit by appropriate voltage, resistance, and continuity measurements. The service procedure is summarized as follows:

a. Visual Inspection. The purpose of visual inspection (par. 37) is to locate any visible trouble. Through this inspection alone, the repairman may frequently discover the trouble, or determine the stage in which the trouble exists. This inspection is valuable in avoiding additional damage to the transmitter which might occur through improper servicing methods, and in forestalling future failures.

b. Input Resistance Measurements. These measurements (par. 57) prevent further damage to the transmitter from possible short circuits. Since this test gives an indication of the condition of the filter circits, its function is more than preventive.

c. Trouble-Shooting Chart. The trouble symptoms

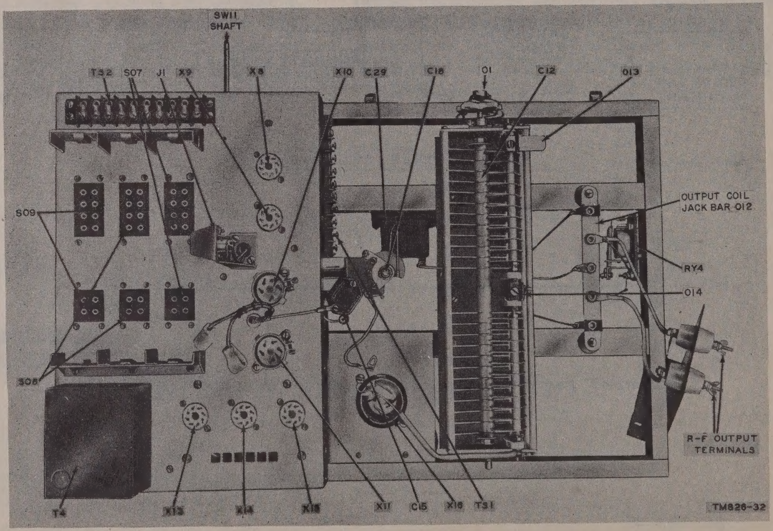


Figure 42. Top view of r-f section.

listed in this chart (par. 58) will aid greatly in localizing trouble.

54. Trouble-shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

Fig. or Par. No.	Description
Fig. 66	Radio Transmitter BC-610-I, schematic diagram.
Fig. 52	Power supply deck resistances.
Fig. 51	Modulator deck voltages and resistances.
Fig. 49	Exciter deck voltages and resistances.
Fig. 64	B+, B-, and bias voltage distributions.
Fig. 50	Exciter deck resistor and capacitor board voltages and resistances.
Fig. 42	Top view of r-f section.
Fig. 45	Bottom view of r-f section.
Fig. 43	Top view of modulator section.
Fig. 46	Bottom view of modulator section.
Fig. 44	Top view of power supply section.
Fig. 47	Bottom view of power supply section.
Fig. 48	Rear view of power panel.
Fig. 53	Cross-section of a representative transmitter tuning unit.
Fig. 60	Test equipment connections.
Fig. 65	Schematic diagrams of transmitter tuning units.
Fig. 55	Relay RY1.
Fig. 56	Relay RY2.
Fig. 58	Relay RY3.
Fig. 59	Relay RY4.
Fig. 57	Relay RY5.
Par. 39	Equipment performance checklist.
Par. 57	Checking key circuits for shorts.
Par. 58	Trouble-shooting chart.
Par. 59	D-c resistances of transformers and coils.
Par. 60	Continuity tests for cables and terminal strips.

55. Test Equipment Required for Trouble Shooting

The test equipment required for trouble shooting Radio Transmitter BC-610-I is listed below. The technical manuals associated with the test equipment are also listed.

Test equipment	Technical manual
Tube Tester I-177	TM 11-2627
Multimeter TS-352/U	TM 11-5227
R-f ammeter, 0 to 2.5 amperes	
Oscilloscope OS-8/U	NAVSHIPS 91, 272
Frequency Meter Set SCR-211-(*)	TM 11-300
Audio Oscillator TS-382	TO 16-35TS382-2
Neon lamp	
Electronic Multimeter TS-505/U	TM 11-5511
*Speech Amplifier BC-614-(*)	TM 11-4043
*Power Unit PE-95-(*)	TM 11-904
*Microphone T-17, T-30, T-45, or T-50	
*Key J-37	
*Radio Receiver BC-312-(*) or BC-342-(*)	TM 11-850

NOTE. Equipment preceded by * is supplementary equipment needed.

56. General Precautions

There are definite general precautions which should by observed when any radio set is being repaired. It is to the advantage of the repairman to observe these rules to the utmost during the repair process in order to save time and future repair of the set.

a. Only competent personnel supplied with adequate tools and equipment are authorized to service and repair this equipment. An inexperienced operator attempting to make repairs may damage the equipment to such an extent that major repairs may be necessary rather than the original minor repairs. Careless replacement of parts often makes new faults inevitable.

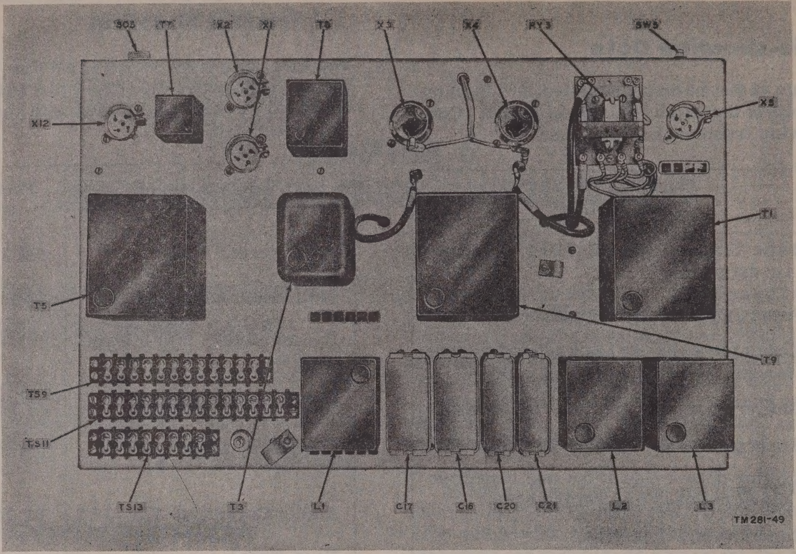

SO5
T7
X2
X1
T8
X3
X4
RY3
SW3
X12
X5
T1
T5
T9
TS9
TS11
TS13
T3
L1
C17
C16
C20
C21
L2
L3
TM 281-49

Figure 43. Top view of modulator section.

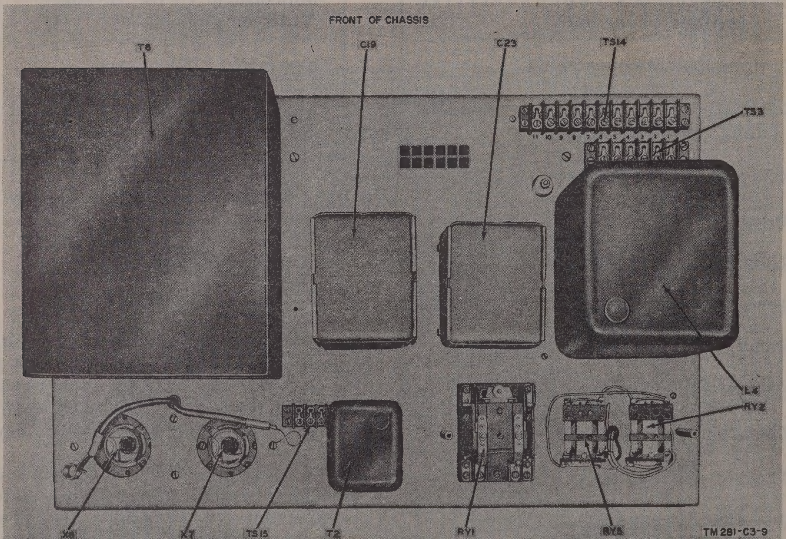

FRONT OF CHASSIS
T6
C19
C23
TS14
TS3
L4
RY2
X6
X7
TS15
T2
RY1
RY5
TM 281-C3-9

Figure 44. Top view of power supply section.

b. The removal and replacement of defective parts or circuit elements are sometimes difficult; be careful not to damage leads or other parts by pulling or pushing them out of the way. Before attempting repairs make sure that the proper tools and test equipment are available.

c. It may be necessary to take out other circuit elements and parts to remove or replace a defective part. Make a careful record of the connections to each part removed and of the position of each part in the unit. Clip all leads as short as possible. Avoid using more solder than necessary to make a secure connection. Solder carelessly dropped in the unit may cause short circuits and may create a new fault. It is very important to make well-soldered joints, since a poorly soldered joint is one of the most difficult faults to find.

d. When a part is replaced it must be placed exactly as the original one. A part which has the same electrical value but different physical size may cause trouble in h-f circuits. Give particular attention to proper grounding when replacing a part. Use the same ground point as in the original circuit wiring. Failure to observe these precautions may result in decreased gain or possibly in oscillation of the circuit.

e. Test tubes before making any repair. Tubes are the most common replacement.

57. Checking Key Circuits for Shorts

a. General. When a transmitter is serviced, no further damage to it should occur. The procedure which the repairman is to follow should assist in the reduction of time in making the repair. Trouble in the transmitter may often be indicated by checking the resistance of the filament, bias, and h-v circuits before applying power to the equipment, thereby, preventing damage to the equipment. Before making the power supply test, check the line voltage with a voltmeter making sure the transmitter has the required input voltage. Leaky or low resistance capacitors will draw excessive current from the rectifier systems. If a short, or a near short is detected by an ohmmeter reading, the defective part is usually a shorted or leaky filter capacitor or an r-f bypass capacitor. A suspected defective capacitor must be disconnected at one end in order to check it individually. Note the polarity of the ohmmeter leads; do not check the electrolytic capacitors with reverse polarity. Figures 49, 51, and 52 give the resistance readings between each terminal of the tube sockets and chassis ground. If the resistance values are normal, make the circuit continuity test between the terminal strips in accordance with table XII to discover possible broken leads and poorly soldered joints. Dress and resolder leads if necessary.

b. Resistance Measurements. The following test indicate the power supply output resistance to ground of the bias power supply, exciter power supply, and the h-v power supply, respectively.

(1) With all transmitter power off, place an ohmmeter from pin 2 or pin 3 of bias rectifier tube V5 to ground. This reading should be at least 3,000 ohms.

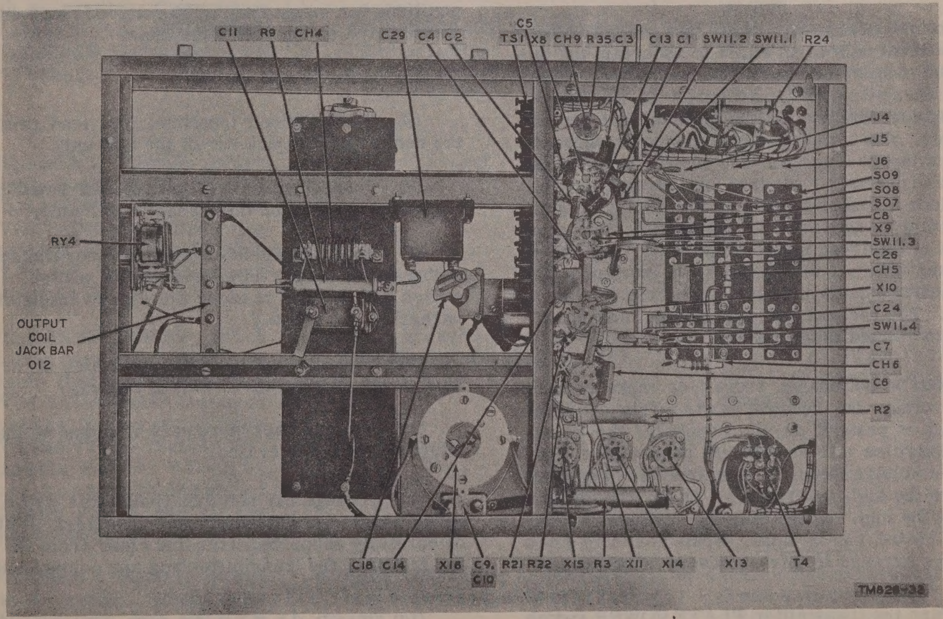


Figure 45. Bottom view of r-f section.

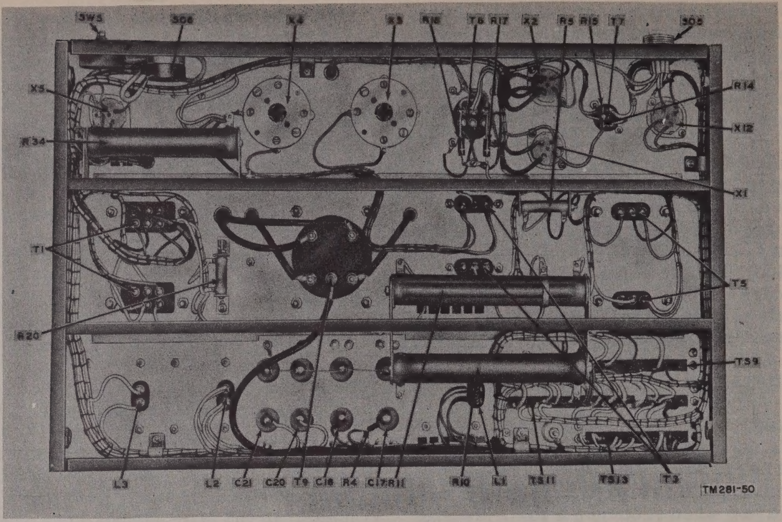


Figure 46. Bottom view of modulator section.

(2) Make an ohmmeter check across terminal 2 of TS9 and ground. A reading of at least 40,000 ohms will indicate no shorts in the exciter rectifier supply output.

(3) Check the resistance from the plate cap of r-f p-a tube V16 to ground. The reading should be at least 80,000 ohms.

c. Voltage Measurements. Make test voltages at the socket terminals in an effort to ascertain the defective part within the stage. These voltage values should be as specified on figures 49 through 51. These diagrams include the voltages at the sockets of the tubes. The voltage measurements shown on the chassis layout diagrams are made between the pin connections to the tube and chassis ground. These values are approximate and will vary slightly with different transmitters and with measuring equipment of different meter sensitivity. Adhere to these values within a tolerance of ±10 percent. The voltage measurements presented are those of normal operation. The recommended procedure for measuring the high voltage is as follows:

WARNING: Do not change fuses or make repairs with high voltage on, because under this condition high voltage is present on all 3 decks of the transmitter. Exercise all reasonable precautions when making d-c voltage tests. It is extremely dangerous to measure the high voltage in this transmitter. Contacting the high voltage present in Radio Transmitter BC-610-I can be fatal. When making this test, always arrange to have someone else present.

(1) Turn the transmitter PLATE POWER switch to off (down).

(2) Turn the FILAMENT POWER switch to off (down).

(3) Insulate the voltmeter well above ground by placing it on dry boards or other insulating material at least 1-inch thick.

(4) Set the voltmeter controls to the proper positions for measuring 3,000 volts direct current as indicated on the voltmeter chart.

(5) Remove coil unit L7.

(6) Place the red (positive) test lead prod into the center jack of jack bar of the coil unit.

(7) Connect black (negative) test lead to any convenient ground on the transmitter frame.

(8) Open right-hand cover door (over transmitter tuning units) to open its interlock switch. (This switch will be used to close the circuit in the step in paragraph 16 below.)

(9) Fasten down the interlock switch at the left-hand cover door so its circuit is closed.

(10) See that back screen is in place so that its interlock switch is closed.

(11) Arrange the red (positive) test prod with cord so that it is extremely well insulated. It should be carefully supported, free and clear from the door and frame of the transmitter and any components.

(12) STAND CLEAR OF THE RED (POSITIVE) TEST LEAD, AND SEE THAT NEITHER YOU NOR

OTHER PERSONNEL COME IN CONTACT WITH IT WHEN HIGH VOLTAGE IS BEING CHECKED.

(13) Set FILAMENT POWER switch to ON. Allow transmitter to warm up.

(14) Set PLATE POWER switch of transmitter at ON.

(15) PUT YOUR LEFT HAND IN YOUR POCKET.

(16) With your right hand, turn on the high voltage by pressing the interlock switch at the right-hand cover door.

(17) Read the voltage indication on the voltmeter and release the interlock switch.

(18) Set PLATE POWER switch to OFF and remove fastening (if used) from left-hand cover interlock when finished.

58. Trouble-shooting Chart

The following chart is supplied as an aid in locating trouble in the radio transmitter. This chart lists the symptoms which the repairman observes, either visually or audible while making a few simple tests. The chart also indicates how to localize trouble quickly to a particular stage of the transmitter. Once the trouble has been localized to a stage or circuit, a tube check and voltage and resistance measurements of this stage or circuit should ordinarily be sufficient to isolate the defective part. Normal voltage and resistance measurements are given in figures 49 through 52.

Symptom	Probable trouble	Correction
1. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates voltage. Green pilot lamp does not light.	1. Lamp LM3 burned out or loose out or loose in socket. Leads broken or defective. Socket defective.	1. Replace LM3 or tighten in socket. Repair. Replace socket.
2. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates no voltage. Green pilot lamp does not light.	2. Fuse FS1, FS2, or FS4 burned out. Switch SW1 defective. Damaged Cord CD-763 or poor contacts at socket.	2. Replace. Replace. Repair Cord CD-763 or socket SO201 or SO6.
3. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates no voltage.	3. Tube V13, V14, or V15 not in socket. FILAMENT VOLTAGE resistor R18 defective. Open connection at terminals 3 or 7 of terminal strip TS1,	3. Place tube properly in its socket. Check sliding arm for contact. Repair or replace resistor. Check connections at terminal strips TS1, TS9, and TS11. Clean or tighten as required.
4. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V1, V2, and V5 are not heated.	4. Fuse FS5 open.	4. Replace.
5. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V6 and V7 are heated. Filaments of tubes V6 and V7 are heated. Filaments of tubes V1, V2, and V5 are not heated.	5. Open connection at terminal 2 or 8 on terminal strip TS11.	5. Check connections at terminals 2 and 8 on terminal strip TS11. Clean or tighten as required.
6. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates	6. Open connection at terminal 7 or 8 on terminal strip TS14.	6. Check connections at terminals 7 and 8 on terminal strip TS14. Clean or tighten as required.

58. Trouble-shooting Chart (continued)

Symptom	Probable trouble	Correction
voltage. Filaments of tubes V1, V2, and V5 are heated. Filaments of tubes V6 and V7 are not heated.		
7. EXCITER PLATE POWER switch in up position. No indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, and INT. AMP. PLATE positions.	7. Defective switch SW3 or SW8. Open choke CH1 or CH2. Open connection at terminal 2 or 5 of terminal strip TS1 or TS9. Defective rectifier tube V12. Open ground lead at terminal 5 of transformer T5.	7. Replace. Replace. Check connections; clean or tighten as required. Replace. Repair connection.
8. EXCITER PLATE POWER switch in up position. Normal indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE position. No reading on EXCITATION METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE, and P. A. Grid positions.	8. Open resistor R8 or choke CH7. Open connection at terminal 4 or 5 of terminal strip TS2, terminal 9 of terminal strip TS1 or TS9, or terminal 13 of terminal strip TS11. Open resistor R11 or R12. Open tap contact on resistor R11.	8. Replace. Check terminal strip connections. Clean or tighten as required. Replace. Clean or tighten tap contact as required.
9. EXCITER PLATE POWER switch in up position. Current excessive on EXCITATION METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE, and P.A. GRID positions.	9. Open filter choke L2 or L3. Defective rectifier tube V5. Open ground connection at terminal 7 of transformer T1. Open resistor R11.	9. Replace. Replace defective tube. Repair open ground circuit. Replace.
10. EXCITER PLATE POWER switch in up position. No current when EXCITATION METER SWITCH is in P.A. GRID position. Normal current on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, and INT. AMP. PLATE positions.	10. Open choke coil CH8. Defective tube V16. Open ground circuit at terminal 8 on transformer T4. Open grid cap clip connection on side of tube V16.	10. Replace. Replace. Repair open ground circuit. Clean or tighten clip connection as required.
11. PLATE POWER switch in on position. No current on P. A. PLATE meter. All other indications normal.	11. Defective switch SW6. Open coil in relay RY1. Defective contacts on relay RY1 or RY2. Open fuse FS3. Open interlock switch SW2, SW5, or SW13. Overload relay RY2 energized. Open filter choke L4. Defective switch SW4. Open plate cap clip connection on top of tube V16. Open primary coil in plug-in unit L7. Open connections between plug-in coil L7 and jack.	11. Replace. Replace. Clean or replace defective contacts as required. Replace. Check position of top access doors and tightness of transmitter back cover. Press OVERLOAD RESET switch. Replace. Replace. Clean or tighten clip connection as required. Replace plug-in unit L7. Clean or tighten connections as required.

59. D-c Resistances of Transformers and Coils

The d-c resistances of the transformer windings and the coils in the transmitter are listed below:

Transformer or coil	Terminals	Ohms
CH1		18
CH2		18
CH3		38
CH4		8.5
CH5		18
CH6		18
CH7		18
CH8		18
CH9		42
L1		100
L2		100
L3		100
L4		70
L7		Less than .1
L8		2.5
L9		1.8
L10		1.8
L11		1
L12		Less than .1
L13		1
L14		3.5
L15		2.3
L16		1
L17		4
L18		2
L19		1.5
L20		Less than .1
L21		Less than .1
L22		Less than .1
L23		Less than .1
L24		Less than .1
L25		Less than .1
L26		Less than .1
L27		Less than .1
L28		Less than .1
L29		Less than .1
L30		Less than .1
L31		Less than .1
L32		Less than .1
L33		Less than .1
L34		Less than .1
L35		Less than .1
L36		Less than .1
L37		Less than .1
L41		1
L42		Less than .1
T1	1 to 2	1.5
	3 to 5	120
	6 to 8	Less than .1
	9 to 11	Less than .1
T2	1 to 2	10.5
	1 to 3	12.5
	4 to 6	Less than .1
T3	1 to 2	3
	4 to 6	Less than .1
T4	1 to 2	2
	4 to 6	Less than .1
	7 to 9	Less than .1
	10 to 12	Less than .1
T5	1 to 2	1.5
	4 to 6	60
T6	1 to 3	Less than .1
	4 to 6	Less than .1
	7 to 9	120

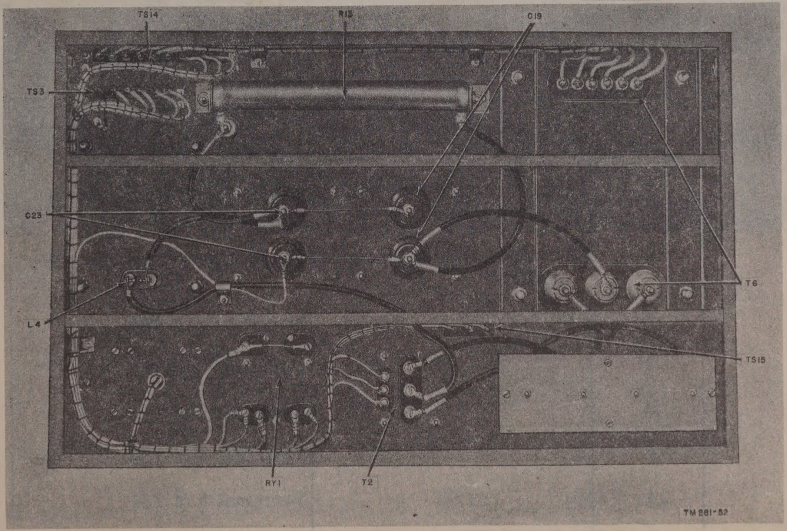


Figure 47. Bottom view of power supply section.

59. D-c Resistances of Transformers and Coils (continued)

Transformer or coil	Terminals	Ohms
T7	1 to 2	23
	3 to 4	625
	3 to 5	1,250
	4 to 5	625
T8	1 to 2	130
	1 to 3	260
	2 to 3	130
	4 to 5	75
	4 to 6	150
	5 to 6	75
T9	1 to 2	350
	1 to 3	700
	2 to 3	350
	4 to 5	160
RY1		110
RY2		400
RY3		400
RY4		400
RY5		6

60. Continuity for Cables and Terminal Strips

a Defects in Radio Transmitter BC-610-I can be detected by performing resistance tests of continuity through cables and terminals in accordance with the procedure outlined below in table XII.

b. Perform tests on ohmmeter range that permit a reading close to the center of scale. If the readings obtained do not agree with those specified in the table, within plus or minus 10 percent, the circuit is defective. If an infinite reading is obtained in a test for which zero is specified, there is an open circuit under test. Check the circuit for poorly soldered or broken connections, burned-out fuses, poor contacts between plug and sockets, and loose connection at terminal strips. Also, by these tests, short circuits and defective parts may be located. Make the necessary repairs and replacements.

c. Perform these tests with a-c power off, the tubes removed, except where indicated otherwise, three transmitter tuning units inserted, and all plugs connected in their proper sockets.

Caution: Make certain that the switches are in the specified position required for the test.

TABLE XII
CONTINUITY CHECKS FOR TERMINAL STRIPS

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Terminal strip TS1	1		Ground or chassis	0
	1		Terminal 1 of TS9	0
	2		Terminal 3 of TS2	0
	2		Terminal 2 of TS2	.4
	2		Terminal 1 of TS2	.2
	2	Remove tube V8 from its socket	Pin 3 of socket for tube V8	5,000
	2	Remove tube V8 from its socket	Pin 4 of socket for tube V8	16,000
	2		Terminal 2 of TS9	0
	3		Terminal 3 of TS9	0
	3		Terminal 7 of TS1	2
	4		Terminal 4 of TS9	0
	4		Terminal 5 of TS1	0
	4		Terminal 6 of TS1	0

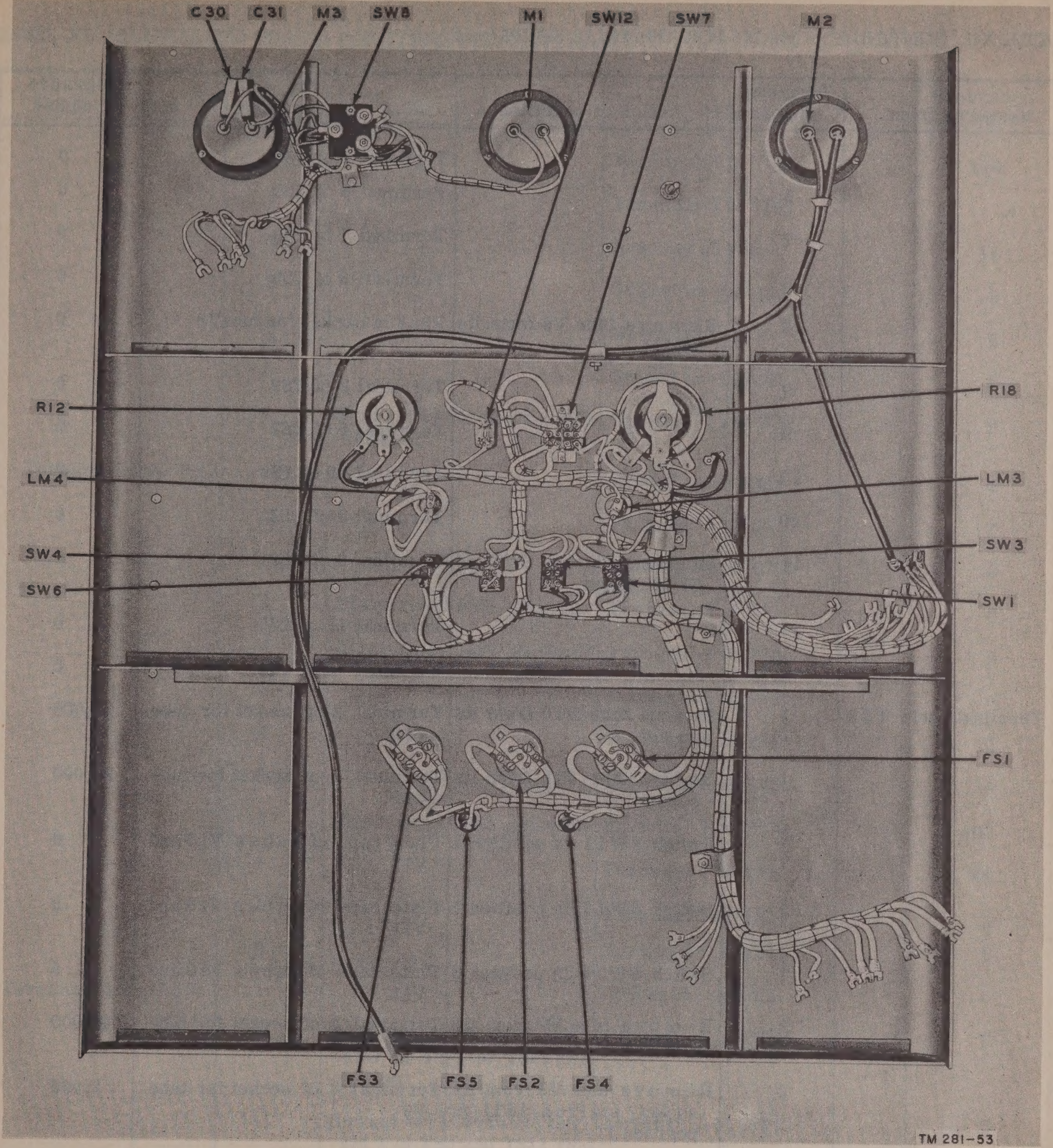

C30
C31
M3
SW8
M1
SW12
SW7
M2
R12
R18
LM4
LM3
SW4
SW3
SW6
SW1
FS1
FS3
FS5
FS2
FS4
TM 281-53

Figure 48. Rear view of power panel.

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
	5		Terminal 5 of TS9	0
	6		Terminal 6 of TS9	0
	7		Terminal 7 of TS9	0
	8		Terminal 8 of TS9	0
	8	Remove tube V8 from its socket	Pin 8 of socket for tubeV8	0
	9		Terminal 9 of TS9	0
	9		Terminal 5 of TS2	0
	10		Terminal 10 of TS9	0
	10		Terminal 9 of TS2	0
	11	Interlock switches SW2 and SW13 closed	Terminal 9 of TS2	0
	11		Terminal 11 of TS9	0
	11		Terminal 10 of TS2	0
Terminal Strip TS2	1	Remove tube V10 from its socket	Terminal 2 of socket for tube V10	22,000
	1	Remove tube V11 from its socket	Terminal 2 of socket for tube V11	22,000
	1	Switch SW11 in position 1	Plate caps of tubes V10 and V11	0
	1	Switch SW11 in position 2	Plate caps of tubes V10 and V11	0
	1	Switch SW11 in position 3	Plate caps of tubes V10 and V11	0
	2	Remove tube V9 from its socket	Terminal 4 of socket for tube V9	49,000
	2	Remove tube V9 from its socket, switch SW11 in position 1	Terminal 3 of socket for tube V9	2,000
	2	Remove tube V9 from its socket, switch SW11 in position 2	Terminal 3 of socket for tube V9	2,000
	2	Remove tube V9 from its socket, switch SW11 in position 3	Terminal 3 of socket for tube V9	2,000
	4	Remove tube V10 from its socket	Terminal 3 of socket for tube V10	4,800
	4	Remove tube V11 from its socket	Terminal 3 of socket for tube V11	4,800

TABLE XII. CONTINUITY CHECKS FOR TERMINAL STRIPS (contd.)

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
	4		Terminal 5 of TS2	470
	5		Terminal 6 of TS2	.4
	6		Grid cap of V16	18
	7		Ground or chassis	0
	7		Meter M3	0
	8		Ground or chassis	0
	9	Top panel access doors closed	Terminal 10 of TS2	0
Terminal strip TS3	1		Ground or chassis	0
	1		Terminal 1 of TS13	0
	2		Terminal 2 of TS13	0
	2	Close relay RY1 manually	Terminal 3 of TS3	0
	2	Close relay RY1 manually	Terminal 4 of TS3	0
	3		Terminal 3 of TS13	0
	4		Terminal 4 of TS13	0
	5		Terminal 5 of TS13	0
	5	Close relay RY5 manually	Terminal 9 of TS14	400
	5		Terminal 6 of TS3	86
	5		Terminal 7 of TS14	2
	6		Terminal 6 of TS13	0
Terminal strip TS9	1		Ground or chassis	0
	1	Ground wire from terminal 1 of TS9 or TS11 removed	Terminal 1 of TS11	0
	1	Ground wire from terminals 1 of TS3 and TS11 removed	Terminal 1 of TS13	0
	2		Ground or chassis	40,000
	3		Terminal 6 of TS11	0
	3		Terminal 9 of TS11	1
	3		Terminal 3 of TS13	1
	5		Ground or chassis	40,000
	7		Terminal 3 of TS11	0

TABLE XII. CONTINUITY CHECKS FOR TERMINAL STRIPS (contd.)

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
	8		Terminal 11 of TS11	0
	8		Pin 2 of SO5	0
	9		Slider arm of R11	0
	10		Terminal 14 of TS11	0
	11	Close interlock SW5 on modulator	Terminal 4 of TS13	0
Terminal strip TS11	1		Ground or chassis	0
	2		Terminal 3 of TS11	0-15
	2		Pin 3 of SO5	0
	2		Terminal 2 of TS13	0
	2	Switch SW7 in C.W. position	Terminal 4 of TS11	400
	2	Switch SW1 in up position	Terminal 7 of TS11	0
	2	Switch SW3 in up position	Terminal 9 of TS11	0
	2	Switch SW6 in up position	Terminal 12 of TS11	0
	3		Terminal 8 of TS14	0
	4	Switch SW7 in PHONE position	Terminal 6 of TS11	0
	4		Terminal 2 of TS13	400
	5	Switch SW1 in FILAMENT POWER position	Terminal 6 of TS11	0
	5		One side of SO6	0
	6		Terminal 8 of TS11	0
	6		Terminal 7 of TS14	0
	7	Switch SW1 in FILAMENT POWER position	Terminal 2 of TS11	0
	7		One side of SO6	0
	8		Pin 1 of SO5	0
	9		Terminal 3 of TS13	0
	9	Switch SW3 in EXCITER PLATE POWER position	Terminal 2 of TS11	0
	10		Ground or chassis	0-500
	10		Grid caps of tubes V3 and V4	28,000
	10	Close relay RY3 manually	Grid caps of tubes V3 and V4	75

TABLE XII. CONTINUITY CHECKS FOR TERMINAL STRIPS (contd.)

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
	11	Switch SW3 in EXCITER PLATE POWER position	Ground or chassis	0
	12	Switch SW6 in PLATE POWER position	Terminal 2 of TS11	0
	12		Pin 4 of SO5	0
	12		Terminal 6 of TS13	0
	12		Terminal 8 of TS13	0
	13		Ground or chassis	500
	14		Terminal 4 of TS14	0
	14	Switch SW4 in NORMAL position	Terminal 1 of TS14	0
Terminal strip TS13	5		Terminal 7 of TS13	0
	5		Terminal 8 of TS13	86
	6		Terminal 8 of TS13	0
Terminal strip TS14	1		Terminal 2 of TS14	0
	1		Terminal 3 of TS14	0
	1		Terminal 4 of TS14	0
	2		Terminal 5 of TS14	0
	3		Terminal 6 of TS14	0
	7		Terminal 6 of TS11	0
	7		Terminal 5 of TS3	2
	8		Terminal 3 of TS11	0
	8		Terminal 9 of TS14	0
	9	Close relay RY5 manually	Terminal 5 of TS3	400
Terminal strip TS15	1		Terminal 4 of TS14	0
	2		Terminal 11 of TS14	0
	3		Terminal 6 of TS11	0
	3		Terminal 10 of TS14	0

Section II. REPAIRS

61. Removal of Decks from Transmitter

All three decks of the transmitter are placed on slide bases and are mounted in the side frames of the transmitter. To remove any deck, proceed as follows:

a. Remove both sides and the back cover of the transmitter.

b. Remove the four bolts on each side which hold the deck to the side frame.

c. Remove all leads from terminal strips and any other connections between the back of the front panel any the deck which is to be removed.

d. Make sure no parts extend beyond the free space through which the deck is to be pulled (for the top deck, the plate caps of V10 and V11 must be removed and the tubes taken out of their sockets).

e. Carefully slide the deck out of the back of the transmitter frame until it is free and can be carried to a convenient work space.

f. The bottom deck (h-v power supply) is heavy because of transformers T2 and T6, inductor L4, and capacitors C19 and C23. At least two men, or preferably three, are needed to handle this deck when it is removed from the transmitter.

62. Replacement of Switches

a. General. The method of removal and replacement of the majority of the switches in the transmitter is apparent upon inspection. It is important, however, that all leads to the switch be tagged before they are disconnected from the lugs or terminals.

b. Removal of Band Switch SW13. First remove the r-f section as described in paragraph 61. Rest the r-f section on its top, and remove the switch as follows:

(1) Disconnect all leads to the switch; tag each one.

(2) Remove the knob from the shaft.

(3) Remove the nut and washer from the shaft on the front of the panel.

(4) Remove the switch from the bottom of the deck by unscrewing the five nuts which secure it to the deck.

(5) Replace in reverse order.

63. Removal of Antenna Tuning Unit BC-939-B

To remove the antenna tuning unit proceed as follows:

a. Disconnect the antenna and ground leads.

b. Disconnect the coaxial cable leading from the transmitter.

c. Take off the four wingnuts holding the tuning unit to the top of the transmitter.

d. Lift the unit up and forward.

64. Refinishing

Instructions for refinishing badly marred panels on exterior cabinets are given in TM 9-2851. Also refer to paragraph 35.

Section III. ALINEMENT AND ADJUSTMENT PROCEDURES

65. Test Instruments Used for Alinement and Adjustment

a. Multimeter TS-352/U is a portable, sealed, general purpose instrument consisting of Multimeter ME-9/U and Multiplier Kit MX-815/U, both mounted in one transit case. Two test leads, one 5,000-volt lead, one multiplier patch cord, several test clips, and battery connection links are furnished with the instrument. It is used for circuit analysis and trouble shooting in electrical and electronic equipment. Multiplier Kit MX-815/U is used to extend the range of the instrument to the 5,000-volt d-c range.

b. The other test instruments used are listed in paragraph 55 and described in their respective manuals.

66. Neutralization

a. Radio Transmitter BC-610-I has been adjusted for neutralization and will not normally require adjustment in the field, except when the setting of neutralizing capacitor C18 has been changed or when r-f p-a tube V16 has been replaced.

b. If necessary, readjustment may be made as follows:

(1) Install Transmitter Tuning Unit TU-52 and associated Coil Unit C-390-C.

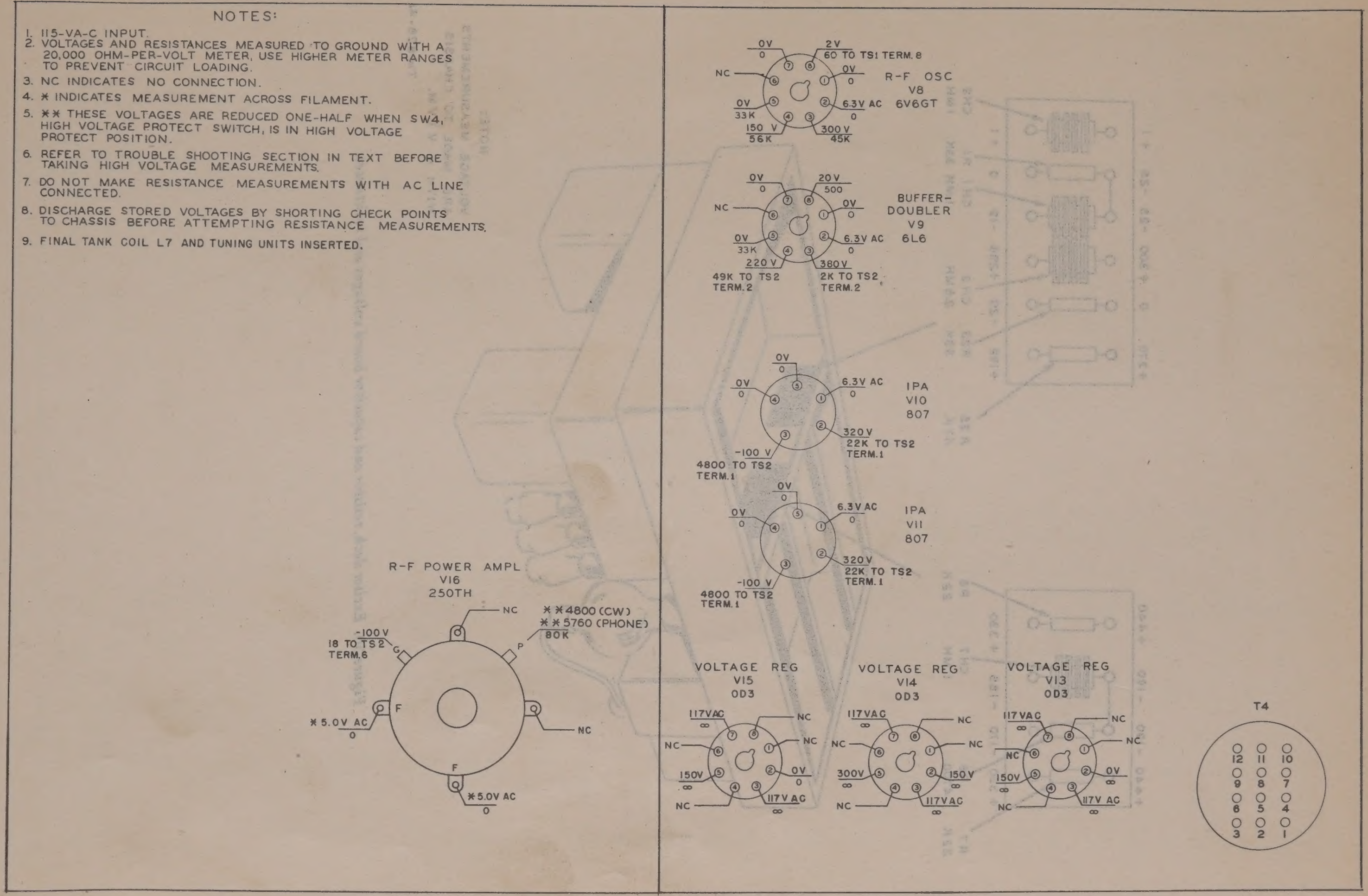
(2) Disconnect the two leads of the coaxial cable from the transmitter output terminals.

(3) Set the PLATE POWER switch on the transmitter at OFF. In this operation h-v plate power is not applied.

(4) Set the FILAMENT POWER switch at ON.

(5) Set the EXCITATION METER switch at P. A. GRID.

(6) Set the EXCITER PLATE POWER switch on (up).

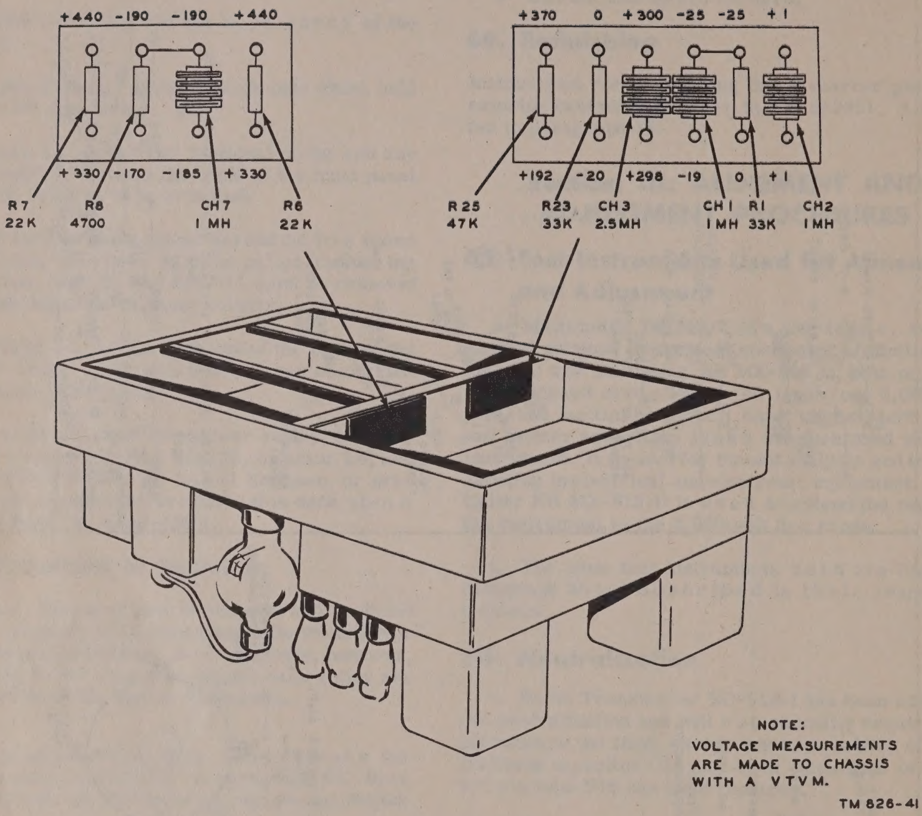

R-F OSC
V8
6V6GT
OV
0
2V
60 TO TS1 TERM. 8
OV
0
6.3V AC
0
300 V
45K
150 V
56K
OV
33K
NC
BUFFER-
DOUBLER
V9
6L6
OV
0
20 V
500
OV
0
6.3V AC
0
380V
2K TO TS2
TERM. 2
220 V
49K TO TS2
TERM. 2
OV
33K
NC
IPA
V10
807
OV
0
OV
0
6.3V AC
0
320V
22K TO TS2
TERM. 1
-100 V
4800 TO TS2
TERM. 1
IPA
V11
807
OV
0
OV
0
6.3V AC
0
320V
22K TO TS2
TERM. 1
-100 V
4800 TO TS2
TERM. 1
R-F POWER AMPL
V16
250TH
NC
* * 4800 (CW)
* * 5760 (PHONE)
80K
P
-100 V
18 TO TS2
TERM. 6
G
F
* 5.0V AC
0
NC
F
* 5.0V AC
0
VOLTAGE REG
V15
OD3
117VAC
∞
NC
NC
NC
OV
0
150V
∞
117V AC
∞
NC
VOLTAGE REG
V14
OD3
117VAC
∞
NC
NC
NC
300V
∞
150 V
∞
117VAC
∞
NC
VOLTAGE REG
V13
OD3
117VAC
∞
NC
NC
NC
OV
∞
150V
∞
117V AC
∞
NC
T4
12
11
10
9
8
7
6
5
4
3
2
1

NOTES:

1. 115-VA-C INPUT.
2. VOLTAGES AND RESISTANCES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER. USE HIGHER METER RANGES TO PREVENT CIRCUIT LOADING.
3. NC INDICATES NO CONNECTION.
4. * INDICATES MEASUREMENT ACROSS FILAMENT.
5. ** THESE VOLTAGES ARE REDUCED ONE-HALF WHEN SW4, HIGH VOLTAGE PROTECT SWITCH, IS IN HIGH VOLTAGE PROTECT POSITION.
6. REFER TO TROUBLE SHOOTING SECTION IN TEXT BEFORE TAKING HIGH VOLTAGE MEASUREMENTS.
7. DO NOT MAKE RESISTANCE MEASUREMENTS WITH AC LINE CONNECTED.
8. DISCHARGE STORED VOLTAGES BY SHORTING CHECK POINTS TO CHASSIS BEFORE ATTEMPTING RESISTANCE MEASUREMENTS.
9. FINAL TANK COIL L7 AND TUNING UNITS INSERTED.

TM826-40

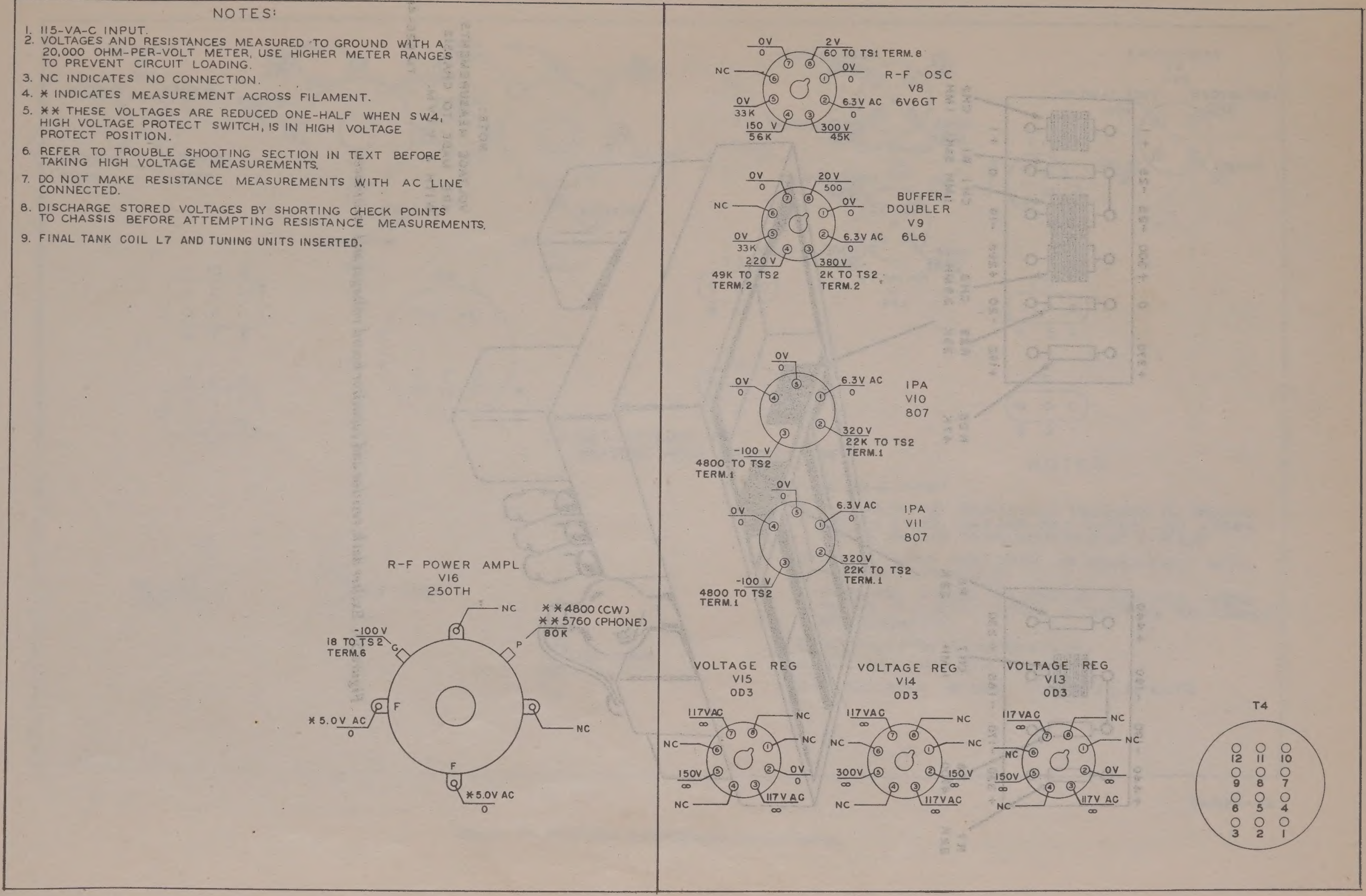
Figure 49. Exciter deck voltages and resistances.


+440 -190 -190 +440
+330 -170 -185 +330
R7 22K
R8 4700
CH7 1 MH
R6 22K
+370 0 +300 -25 -25 +1
+192 -20 +298 -19 0 +1
R25 47K
R23 33K
CH3 2.5MH
CH1 1MH
R1 33K
CH2 1MH

NOTE:
VOLTAGE MEASUREMENTS ARE MADE TO CHASSIS WITH A VTVM.

TM 826-41

Figure 50. Exciter deck, resistor and capacitor board voltages and resistances.


R-F OSC
V8
6V6GT
0V
0
2V
60 TO TS1 TERM.8
NC
0V
0
0V
33K
6.3V AC
0
150 V
56K
300 V
45K
BUFFER-DOUBLER
V9
6L6
0V
0
20V
500
NC
0V
0
0V
33K
6.3V AC
0
220 V
49K TO TS2 TERM.2
380V
2K TO TS2 TERM.2
IPA
V10
807
0V
0
0V
0
6.3V AC
0
320V
22K TO TS2 TERM.1
-100 V
4800 TO TS2 TERM.1
IPA
V11
807
0V
0
0V
0
6.3V AC
0
320V
22K TO TS2 TERM.1
-100 V
4800 TO TS2 TERM.1
R-F POWER AMPL
V16
250TH
NC
** 4800 (CW)
** 5760 (PHONE)
80K
-100V
18 TO TS2 TERM.6
G
P
F
F
* 5.0V AC
0
NC
* 5.0V AC
0
VOLTAGE REG
V15
0D3
117VAC
∞
NC
NC
NC
150V
∞
0V
0
NC
117V AC
∞
VOLTAGE REG
V14
0D3
117VAC
∞
NC
NC
NC
300V
∞
150 V
∞
NC
117VAC
∞
VOLTAGE REG
V13
0D3
117VAC
∞
NC
NC
NC
150V
∞
0V
∞
NC
117V AC
∞
T4
12
11
10
9
8
7
6
5
4
3
2
1
TM826-40

NOTES:

1. 115-VA-C INPUT.
2. VOLTAGES AND RESISTANCES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER, USE HIGHER METER RANGES TO PREVENT CIRCUIT LOADING.
3. NC INDICATES NO CONNECTION.
4. * INDICATES MEASUREMENT ACROSS FILAMENT.
5. ** THESE VOLTAGES ARE REDUCED ONE-HALF WHEN SW4, HIGH VOLTAGE PROTECT SWITCH, IS IN HIGH VOLTAGE PROTECT POSITION.
6. REFER TO TROUBLE SHOOTING SECTION IN TEXT BEFORE TAKING HIGH VOLTAGE MEASUREMENTS.
7. DO NOT MAKE RESISTANCE MEASUREMENTS WITH AC LINE CONNECTED.
8. DISCHARGE STORED VOLTAGES BY SHORTING CHECK POINTS TO CHASSIS BEFORE ATTEMPTING RESISTANCE MEASUREMENTS.
9. FINAL TANK COIL L7 AND TUNING UNITS INSERTED.

Figure 49. Exciter deck voltages and resistances.

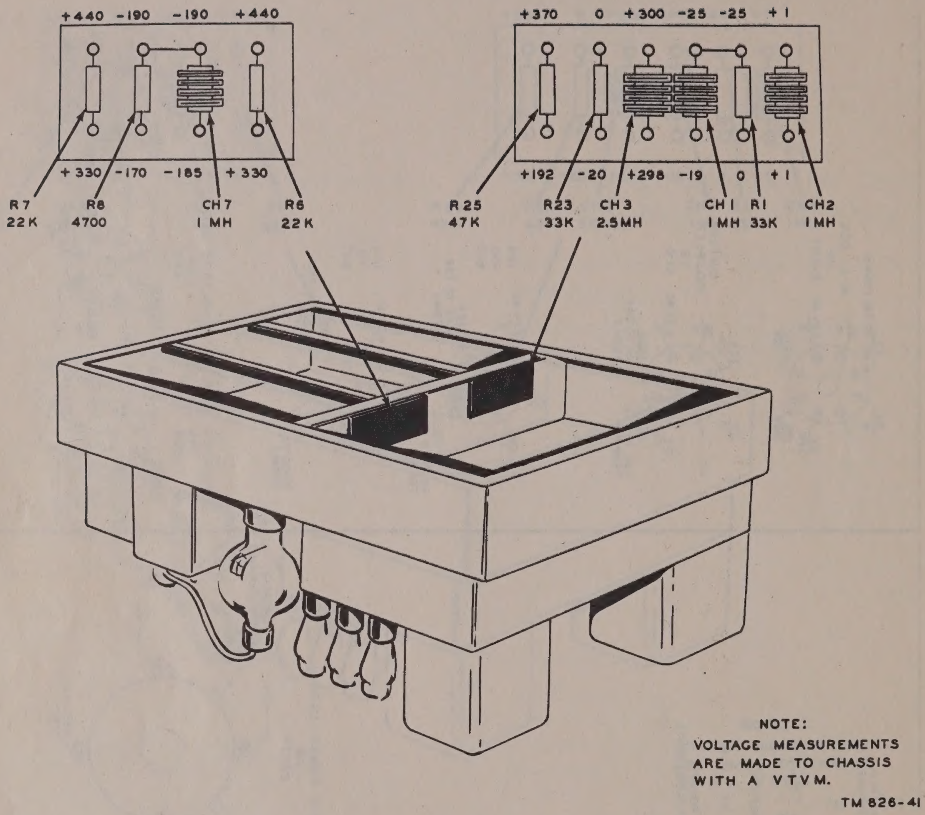
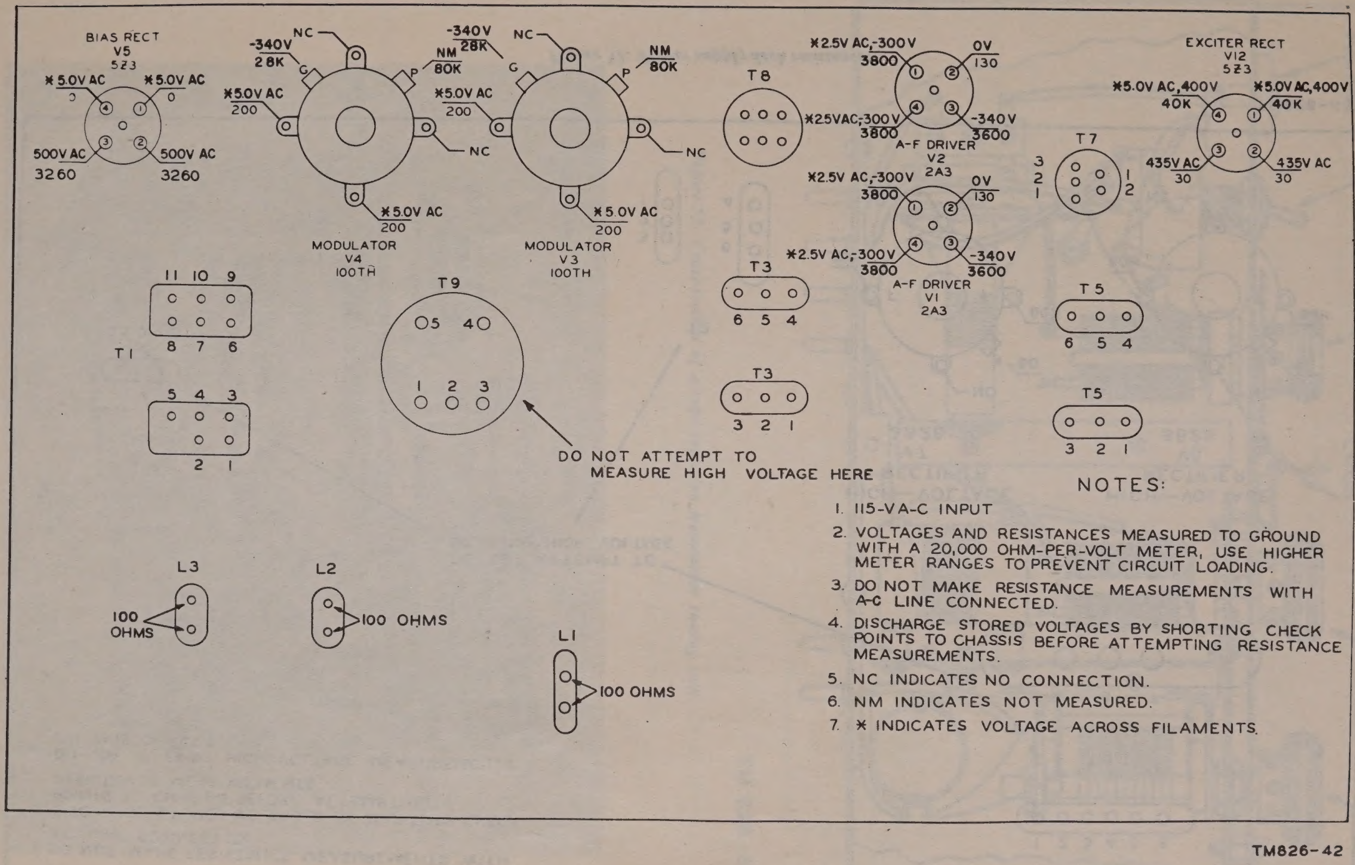

+440 -190 -190 +440
+330 -170 -185 +330
R7 22K
R8 4700
CH7 1 MH
R6 22K
+370 0 +300 -25 -25 +1
+192 -20 +298 -19 0 +1
R25 47K
R23 33K
CH3 2.5MH
CH1 1MH
R1 33K
CH2 1MH
NOTE:
VOLTAGE MEASUREMENTS ARE MADE TO CHASSIS WITH A VTVM.
TM 826-41

Figure 50. Exciter deck, resistor and capacitor board voltages and resistances.

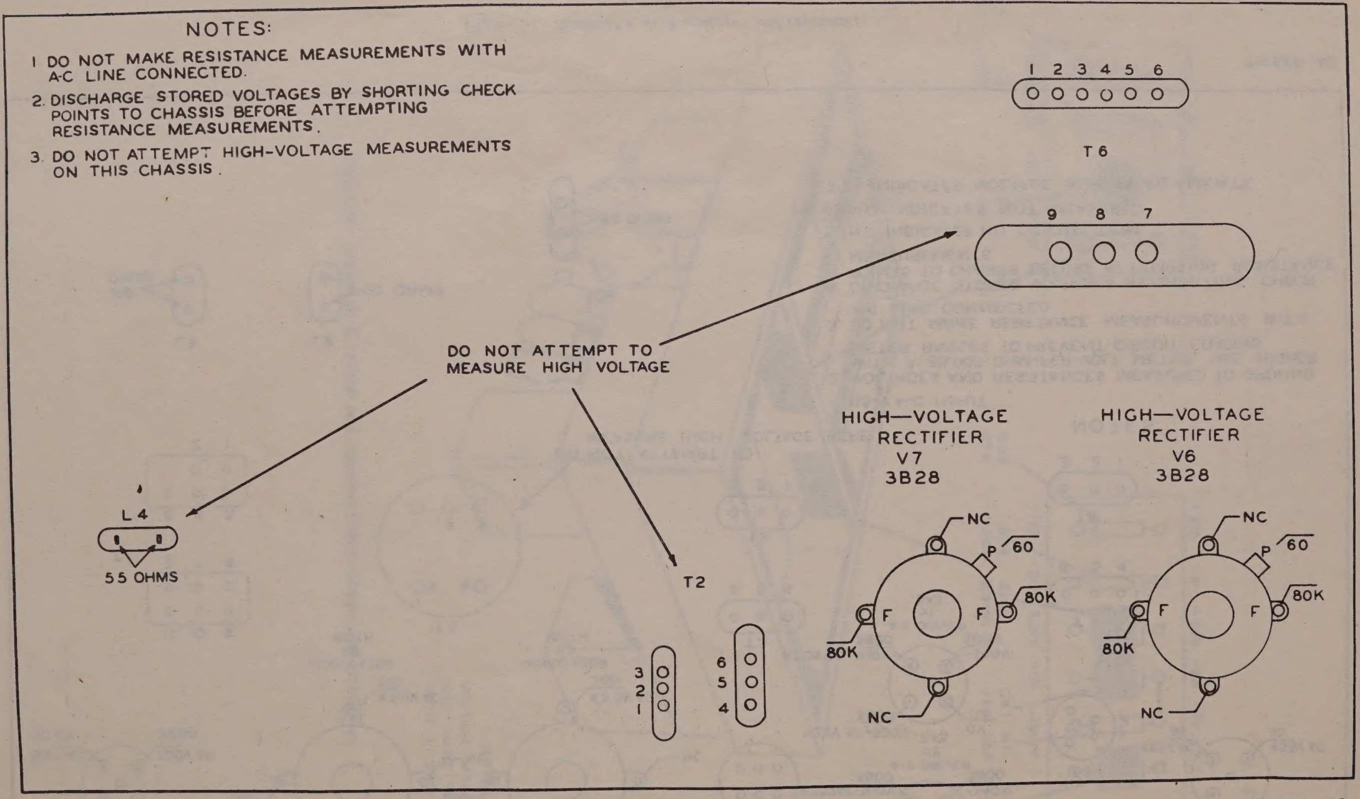

BIAS RECT
V5
5Z3
*5.0V AC
*5.0V AC
0
500V AC
3260
500V AC
3260
-340V
28K
NC
*5.0V AC
200
P
NM
80K
NC
*5.0V AC
200
MODULATOR
V4
100TH
-340V
28K
NC
G
P
NM
80K
*5.0V AC
200
NC
*5.0V AC
200
MODULATOR
V3
100TH
T8
*2.5V AC,-300V
3800
0V
130
*25VAC,-300V
3800
-340V
3600
A-F DRIVER
V2
2A3
*2.5V AC,-300V
3800
0V
130
*2.5V AC,-300V
3800
-340V
3600
A-F DRIVER
V1
2A3
T7
3 2 1
1 2
EXCITER RECT
V12
5Z3
*5.0V AC,400V
40K
*5.0V AC,400V
40K
435V AC
30
435V AC
30
T1
11 10 9
8 7 6
5 4 3
2 1
T9
5 4
1 2 3
T3
6 5 4
T3
3 2 1
T5
6 5 4
T5
3 2 1
L3
100 OHMS
L2
100 OHMS
L1
100 OHMS
TM826-42

DO NOT ATTEMPT TO MEASURE HIGH VOLTAGE HERE

NOTES:

1. 115-VA-C INPUT
2. VOLTAGES AND RESISTANCES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER, USE HIGHER METER RANGES TO PREVENT CIRCUIT LOADING.
3. DO NOT MAKE RESISTANCE MEASUREMENTS WITH A-C LINE CONNECTED.
4. DISCHARGE STORED VOLTAGES BY SHORTING CHECK POINTS TO CHASSIS BEFORE ATTEMPTING RESISTANCE MEASUREMENTS.
5. NC INDICATES NO CONNECTION.
6. NM INDICATES NOT MEASURED.
7. * INDICATES VOLTAGE ACROSS FILAMENTS.

Figure 51. Modulator deck voltages and resistances.


NOTES:
1 DO NOT MAKE RESISTANCE MEASUREMENTS WITH A-C LINE CONNECTED.
2. DISCHARGE STORED VOLTAGES BY SHORTING CHECK POINTS TO CHASSIS BEFORE ATTEMPTING RESISTANCE MEASUREMENTS.
3. DO NOT ATTEMPT HIGH-VOLTAGE MEASUREMENTS ON THIS CHASSIS.
1 2 3 4 5 6
T 6
9 8 7
DO NOT ATTEMPT TO MEASURE HIGH VOLTAGE
L 4
55 OHMS
T2
3
2
1
6
5
4
HIGH—VOLTAGE RECTIFIER
V7
3B28
NC
P
60
80K
F
F
80K
NC
HIGH—VOLTAGE RECTIFIER
V6
3B28
NC
P
60
80K
F
F
80K
NC

TM826-43

Figure 52. Power supply deck resistances.

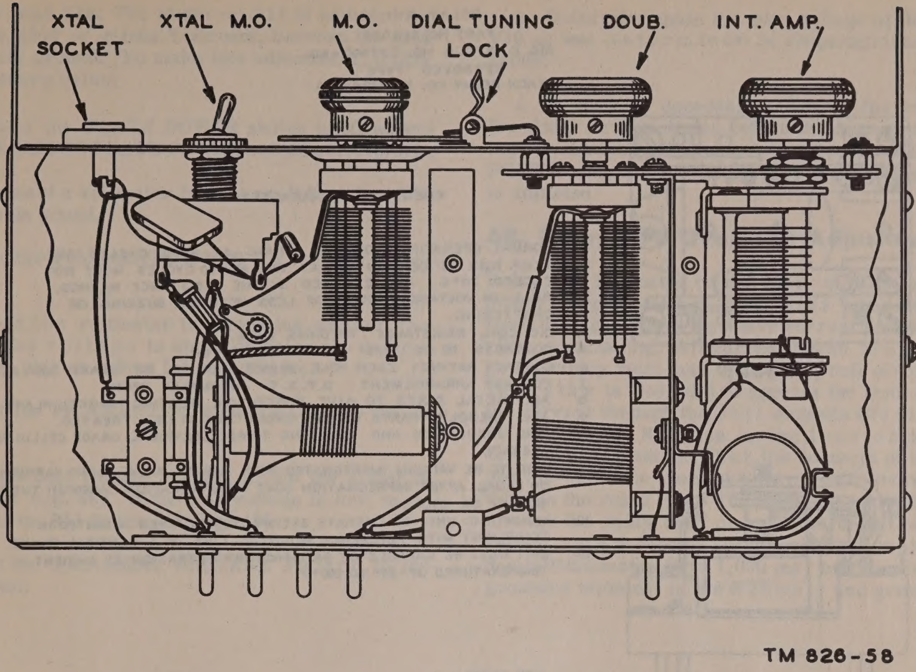

XTAL SOCKET
XTAL M.O.
M.O.
DIAL TUNING LOCK
DOUB.
INT. AMP.
TM 826-58

Figure 53. Cross-section of a representative transmitter tuning unit.

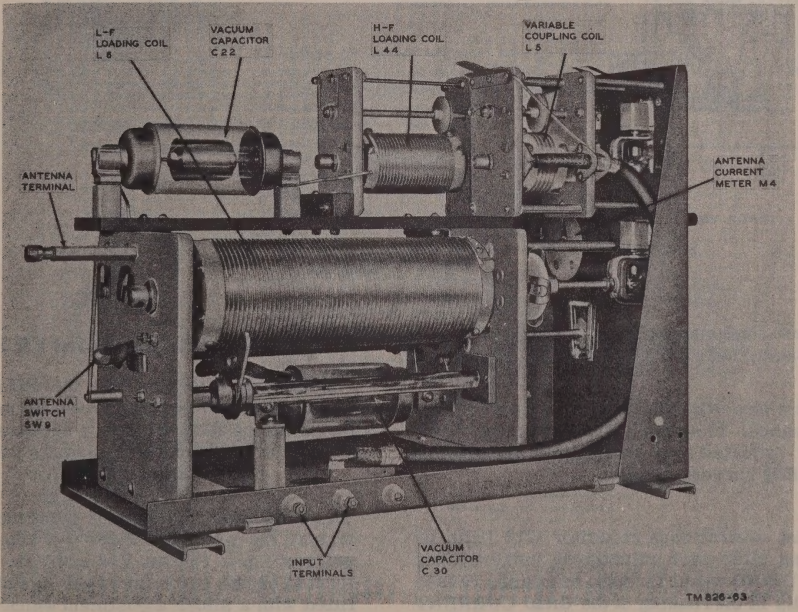
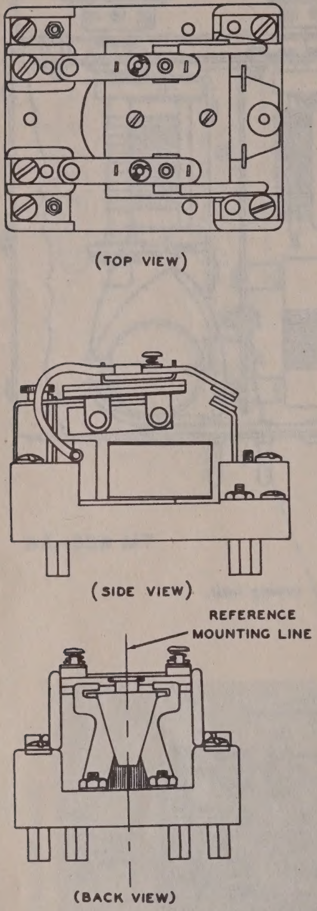

L-F LOADING COIL L 6
VACUUM CAPACITOR C 22
H-F LOADING COIL L 44
VARIABLE COUPLING COIL L 5
ANTENNA TERMINAL
ANTENNA CURRENT METER M4
ANTENNA SWITCH SW 9
INPUT TERMINALS
VACUUM CAPACITOR C 30
TM 826-63

Figure 54. Antenna Tuning Unit BC-939-B, interior view.

RELAY RY1
PART NO. 21B098
SIG. C STOCK NO. 2Z7590-88
APPROVED TYPE
LEACH RELAY CO. NO. 6104-20A



ELECTRICAL CHARACTERISTICS

1. NORMAL OPERATING VOLTAGE: 117V AC AT 50/60 CYCLES/SEC.
2. TEMP. RISE OF COIL IN AIR AT 117V AC 60 CYCLES MUST NOT EXCEED 70°C AS MEASURED BY THE RESISTANCE METHOD.
3. PULL-IN VOLTAGE: 90V AC OR LESS WITHOUT BUZZING OR CHATTERING.
4. D.C. COIL RESISTANCE 106 OHMS ±10%.
5. CONTACTS TO BE 3/8" DIAM. FINE SILVER.
6. CONTACT RATING: EACH POLE 30 AMP. 110V AC OR 20 AMP 220V AC.
7. CONTACT ARRANGEMENT: D.P.S.T. NORMALLY OPEN.
8. ALL METAL PARTS TO HAVE PROTECTIVE PLATING. NICKEL PLATE
9. ALL PHENOLIC PARTS TO BE FUNGUS RESISTANT TREATED.
10. COIL INSULATION AND COVERING TO BE ELECTRICAL GRADE CELLULOSE ACETATE.
11. COIL TO BE VACUUM IMPREGNATED WITH HARVEL 612-C CLEAR VARNISH OR EQUAL. AFTER IMPREGNATION COAT WITH FUNGICIDAL VARNISH TUF-ON NO. 74 F OR EQUAL.
12. MOUNTING: UNIT TO OPERATE SATISFACTORILY WHEN MOUNTED IN EQUIPMENT WITH REFERENCE MOUNTING LINE. IN A VERTICAL PLANE.
13. UNIT MUST BE CAPABLE OF SATISFACTORY OPERATION AT AMBIENT TEMPERATURES OF -65° TO 150° F.

TM 826-46

Figure 55. Relay RY1.

(7) Adjust controls of tuning unit to resonance at some frequency near the h-f end of the range.

(8) Adjust the PLATE TUNING wheel slowly through resonance. If neutralization is faulty, resonance will be indicated by a sharp dip in the reading of the P.A. GRID current reading.

(9) Adjust neutralizing capacitor C18 little by little, checking after each adjustment, until rotating the PLATE TUNING wheel through resonance causes only a slight dip in the reading of the GRID CURRENT meter. When properly neutralized this dip will not exceed 3 ma.

67. R-f Bias Adjustment (R11)

Caution: Always set the FILAMENT POWER switch to the off position before making slider adjustments on R11. This is a necessary precaution to prevent being shocked by the bias power supply.

This adjustment determines the value of the bias voltage at the grid of the r-f p-a tube (V16) and at the grids of i-p-a tubes V10 and V11. Resistor R11 is located on the bottom of the modulator deck and is fitted with a slider adjustment which varies the position of the tap. By moving the tap to the proper position, the correct bias may be obtained at the grids of

V10, V11, and V16. The slider on R11 is adjusted for 110 volts, plus or minus 5 percent, between the grid of V16 and ground. To make this adjustment, follow the procedure below:

a. Place the PLATE POWER switch to off (down) and the EXCITER PLATE POWER switch at NORMAL.

b. Connect a voltmeter between the gird of V16 and chassis gound.

c. Set the FILAMENT POWER switch to the on position.

d. Read the voltmeter to determine whether the present bias voltage is above or below the desired 110 volts, plus or minus 5 percent value.

e. Set the FILAMENT POWER switch to the off position.

f. If the bias voltage is high, move the slider to the right (fig. 46). If the bias voltage is low, move the slider on R11 to the left (fig. 46).

g. Set the FILAMENT VOLTAGE switch to the on position.

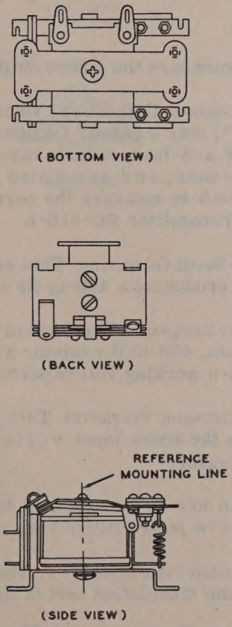
h. Determine again the bias voltage at the grid of V16 as was determined in subparagraphs c and d above.

i. It may be necessary to change the position of the slider several times before the correct bias voltage is obtained. Be certain to place the FILAMENT POWER switch to the off position each time the slider is adjusted

68. Relay RY5 Overload Adjustment

Relay RY5 is located on the lower deck of the transmitter. It protects h-v rectifier tubes V6 and V7 from damage caused by heavy current surges or serious overloading. All current drawn from the h-v power supply must pass through the coil of relay RY5. The relay is designed to operate the contacts when the current through the coil exceeds 670 to 710 ma. To adjust relay RY5, the spring tension adjusting screw must be set so that the contacts of the relay operate when the current specified above passes through the relay coil. To check the current flowing through the relay coil, connect a 6-volt battery in series with a 5-ohm, 10-watt variable resistor and d-c milliammeter (0 to 1,000 ma) between the ungrounded terminal of the RY5 coil and ground. De-

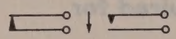
RELAY RY2
PART NO. 218097
SIG C STOCK NO. 227590-187
APPROVED TYPE
AUTOMATIC ELECTRIC MFG. CO. TYPE R22



ELECTRICAL CHARACTERISTICS

1. NORMAL OPERATING VOLTAGE: 117V. AC AT 50/60 CYCLES/SEC.
2. TEMP. RISE AT 117V AC 60CYCLES SHALL NOT EXCEED 70°C (INTERNAL)
3. PULL-IN VOLTAGE: 95V OR LESS WITHOUT CHATTERING.
4. D.C. COIL RESISTANCE: 400 OHM.
5. CONTACTS TO BE FINE SILVER.
6. CONTACT RATING: 5 AMPS AT 125V.
7. CONTACT ARRANGEMENT: D.P.D.T. ONE CONTACT OPEN AND ONE CLOSED IN NORMAL POSITION.
8. BREAKDOWN VOLTAGE BETWEEN WINDING AND FRAME 1500V.
9. ALL METAL PARTS TO HAVE PROTECTIVE PLATING.
10. ALL PHENOLIC PARTS TO BE FUNGUS RESISTANT TREATED.
11. COIL INSULATION AND COVERING TO BE ELECTRICAL GRADE CELLULOSE ACETATE.
12. COIL TO BE VACUUM IMPREGNATED WITH HARVEL 612-C CLEAR VARNISH OR EQUAL. AFTER IMPREGNATION COAT WITH FUNGICIDAL VARNISH. TUF-ON NO. 74 F OR EQUAL.
13. MOUNTING: UNIT TO OPERATE SATISFACTORILY WHEN MOUNTED IN EQUIPMENT WITH "REFERENCE MOUNTING LINE" IN A VERTICAL PLANE.
14. UNIT MUST BE CAPABLE OF SATISFACTORY OPERATION AT AMBIENT TEMPERATURES OF -65° TO 150°F.

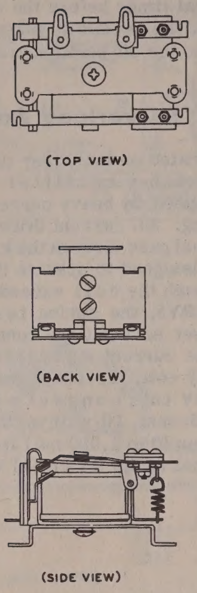
CONTACT ARRANGEMENT



TM 826-47

Figure 56. Relay RY2.

RELAY RY 5
PART NO. 218095
SIG.C. STOCK NO. 2Z7588-115
APPROVED TYPE
AUTOMATIC ELECTRIC MFG. CO. TYPE R 22



ELECTRICAL CHARACTERISTICS

1. COIL OPERATING VOLTAGE, 4.2 V. D.C: 600 MA 30 MA
   6 OHMS D.C. RESISTANCE
   NOT GROUNDED
2. CONTACT ARRANGEMENT: D.P.S.T.
3. CONTACT RATING: 5 AMPS AT 125 V.
4. CONTACT MATERIAL: PURE FINE SILVER
5. INSULATION: FUNGUS VARNISH TREATED TO MEET SIG.C.SPECS.
6. MOUNTING: UNIT TO OPERATE SATISFACTORILY WHEN MOUNTED IN EQUIPMENT WITH "REFERENCE MOUNTING LINE", IN A VERTICAL PLANE.
7. ALL METAL PARTS TO HAVE PROTECTIVE PLATING.
8. UNIT MUST BE CAPABLE OF SATISFACTORY OPERATION AT AMBIENT TEMPERATURES OF -65° TO 150° F.

TM 826-50

Figure 57. Relay RY5.

crease the value of the 5-ohm variable resistor, noting the current indicated at the time the relay operates. Adjust the spring tension of the relay, if necessary, so that the relay operates in the range indicated above.

Section IV. FINAL TESTING

69. General

This section is intended as a guide to be used in determining the quality of a repaired Radio Transmitter BC-610-I. The minimum test requirements outlined in paragraph 71 below may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation.

70. Test Equipment Required for Final Testing

The instruments needed for testing the repaired transmitter are listed below:

a. R-F AMMETER. This meter should be of the thermocouple type with a range of 0 to 2.5 amperes. It is used to measure the power output.

b. OSCILLOSCOPE. Cathode ray Oscilloscope OS-/U or BC-1060-(*) may be used. Oscilloscope BC-1060-(*) consists of a 3-inch cathode ray tube, amplifiers, a linear time base, and associated power supplies. It may be used to measure the percentage modulation of Radio Transmitter BC-610-I.

c. AUDIO SIGNAL GENERATOR. This generator must be capable of producing a 400-cycle output of .30 volt.

d. DUMMY ANTENNA. The dummy antenna consists of a 146-ohm, 400-watt resistor and a 50-uuf, 7,500 to 10,000 d-c working volt capacitor in series.

e. A-C ELECTRONIC VOLTMETER. This equipment is used to measure the audio input voltage from the audio signal generator.

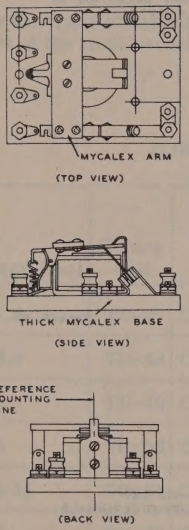
f. KEY. A key is needed to key the transmitter during the c-w power output test.

g. SPEECH AMPLIFIER BC-614-(*). The speech amplifier is used in the modulation test of the transmitter.

71. Power Output and Modulation Tests

a. GENERAL. After the repairs in the transmitter

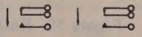
RELAY RY3
PART # 218098
SIGNAL CORPS STOCK NO. 2Z7590-188
APPROVED TYPE
AUTOMATIC ELECTRIC MFG. CO. TYPE R51



ELECTRICAL CHARACTERISTICS

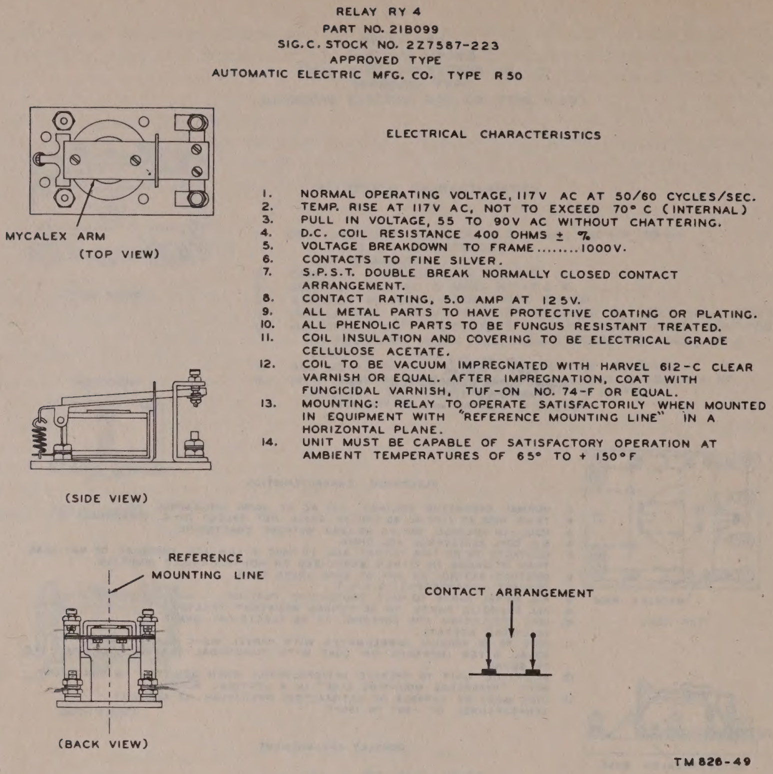
1. NORMAL OPERATING VOLTAGE: 117V AC AT 50/60 CYCLES/SEC.
2. TEMP. RISE AT 117V AC 60 CYCLES SHALL NOT EXCEED 70° C (INTERNAL)
3. PULL-IN VOLTAGE: 95V AC OR LESS WITHOUT CHATTERING.
4. D.C. COIL RESISTANCE 400 OHMS.
5. CONTACTS TO BE FINE SILVER AND TO HAVE A CONTACT PRESSURE OF NOT LESS THAN 16 GRAMS IN EITHER ENERGIZED OR NON-ENERGIZED POSITION.
6. CONTACT RATING: 1/2 AMP AT 2000 VOLTS EACH.
7. CONTACT ARRANGEMENT: D. P. D. T.
8. ALL METAL PARTS TO HAVE PROTECTIVE PLATING.
9. ALL PHENOLIC PARTS TO BE FUNGUS RESISTANT TREATED.
10. COIL INSULATION AND COVERING TO BE ELECTRICAL GRADE CELLULOSE ACETATE.
11. COIL TO BE VACUUM IMPREGNATED WITH HARVEL 612-C CLEAR VARNISH OR EQUAL. AFTER IMPREGNATION COAT WITH FUNGICIDAL VARNISH, TUF-ON 74F OR EQUAL.
12. MOUNTING: UNIT TO OPERATE SATISFACTORILY WHEN MOUNTED IN EQUIPMENT WITH "REFERENCE MOUNTING LINE" IN A VERTICAL PLANE.
13. UNIT MUST BE CAPABLE OF SATISFACTORY OPERATION AT AMBIENT TEMPERATURES OF −65° TO 150°F.

CONTACT ARRANGEMENT



TM 826-48

Figure 58. Relay RY3.



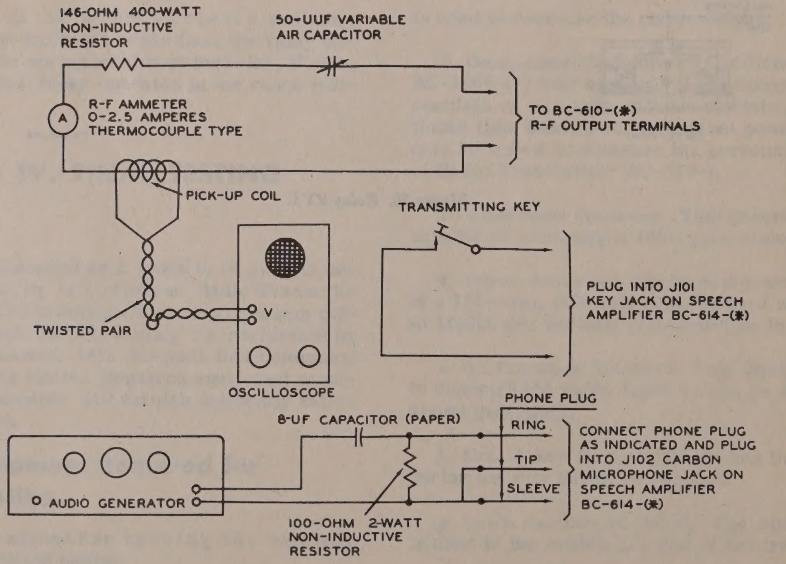
RELAY RY 4
PART NO. 21B099
SIG. C. STOCK NO. 2Z7587-223
APPROVED TYPE
AUTOMATIC ELECTRIC MFG. CO. TYPE R 50

ELECTRICAL CHARACTERISTICS

1. NORMAL OPERATING VOLTAGE, 117 V AC AT 50/60 CYCLES/SEC.
2. TEMP. RISE AT 117V AC, NOT TO EXCEED 70° C (INTERNAL)
3. PULL IN VOLTAGE, 55 TO 90V AC WITHOUT CHATTERING.
4. D.C. COIL RESISTANCE 400 OHMS ± %
5. VOLTAGE BREAKDOWN TO FRAME........1000V.
6. CONTACTS TO FINE SILVER.
7. S.P.S.T. DOUBLE BREAK NORMALLY CLOSED CONTACT ARRANGEMENT.
8. CONTACT RATING, 5.0 AMP AT 125V.
9. ALL METAL PARTS TO HAVE PROTECTIVE COATING OR PLATING.
10. ALL PHENOLIC PARTS TO BE FUNGUS RESISTANT TREATED.
11. COIL INSULATION AND COVERING TO BE ELECTRICAL GRADE CELLULOSE ACETATE.
12. COIL TO BE VACUUM IMPREGNATED WITH HARVEL 612-C CLEAR VARNISH OR EQUAL. AFTER IMPREGNATION, COAT WITH FUNGICIDAL VARNISH, TUF-ON NO. 74-F OR EQUAL.
13. MOUNTING: RELAY TO OPERATE SATISFACTORILY WHEN MOUNTED IN EQUIPMENT WITH "REFERENCE MOUNTING LINE" IN A HORIZONTAL PLANE.
14. UNIT MUST BE CAPABLE OF SATISFACTORY OPERATION AT AMBIENT TEMPERATURES OF 65° TO + 150°F

MYCALEX ARM
(TOP VIEW)
(SIDE VIEW)
REFERENCE MOUNTING LINE
(BACK VIEW)
CONTACT ARRANGEMENT
TM 826-49

Figure 59. Relay RY4.



146-OHM 400-WATT NON-INDUCTIVE RESISTOR
50-UUF VARIABLE AIR CAPACITOR
R-F AMMETER 0-2.5 AMPERES THERMOCOUPLE TYPE
A
TO BC-610-(*) R-F OUTPUT TERMINALS
PICK-UP COIL
TRANSMITTING KEY
PLUG INTO J101 KEY JACK ON SPEECH AMPLIFIER BC-614-(*)
V
TWISTED PAIR
OSCILLOSCOPE
PHONE PLUG
8-UF CAPACITOR (PAPER)
RING
TIP
SLEEVE
CONNECT PHONE PLUG AS INDICATED AND PLUG INTO J102 CARBON MICROPHONE JACK ON SPEECH AMPLIFIER BC-614-(*)
AUDIO GENERATOR
100-OHM 2-WATT NON-INDUCTIVE RESISTOR
TM 826-44

Figure 60. Test equipment connections.

have been completed, make a final test to ascertain that the unit is in proper condition for tactical use. Although the transmitter may be correctly adjusted during the repair procedure, make a recheck of the neutralization, then proceed to final testing of the power output and modualtion.

b. PREPARATION FOR TESTING. To measure the power output and modulation capabilities of the transmitter, connect the test circuits as shown in figure 60. Proceed as follows:

(1) Disconnect the coaxial cable which is between the transmitter and the Antenna Tuning Unit BC-939-B.

(2) Connect the dummy antenna to the transmitter r-f output terminals with the r-f test ammeter is series with one lead.

(3) Couple the transmitter output to the vertical deflection plates of the oscilloscope by means of a pick-up coil. This is done by winding 2 to 4 turns of insulated wire (#14 gage, soft-drawn copper) over a winding space of 3 inches around one of the r-f leads which connects the dummy antenna to the transmitter output post. Connect the ends of the coil to the oscilloscope by means of a twisted-pair line.

(4) Connect the transmitter to a 5-kw, single-phase, 60-cycle, 115-volt power source.

(5) Connect a Speech Amplifier BC-614-(*), one which is known to be in good operating condition, to the transmitter.

c. POWER OUTPUT TEST AT C-W TRANSMISSION. (1) With a transmitter key, such as Key J-37 plugged into jack J101 on Speech Amplifier BC-614-(*), adjust the transmitter for maximum c-w power output (key down); test at the middle of the 2- to 2.5-mc frequency band in accordance with table XIII below.

TABLE XIII

POWER OUTPUT AND MODULATION CAPABILITY

Frequency range (mc)	Tuning unit	Coil unit	Power C.W.	Output, PHONE, (unmodulated)	R-f output current in amperes		
					C.W.	PHONE (unmodulated)	PHONE (90% modulated)
2 to 2.5	TU-47	C-387-B	400	300	1.66	1.46	1.72
2.5 to 3.2	TU-48	C-387-B	400	300	1.66	1.46	1.72
3.2 to 4	TU-49	C-387-B	400	300	1.66	1.46	1.72
4 to 5	TU-50	C-388-A	400	300	1.66	1.46	1.72
5 to 6.35	TU-51	C-389-A	400	300	1.66	1.46	1.72
6.35 to 8	TU-52	C-390-A	400	300	1.66	1.46	1.72
8 to 12	TU-53	C-447	300	250	1.46	1.3	1.53
12 to 14	TU-54	C-448	275	200	1.37	1.17	1.38
14 to 18	TU-54	C-449	275	200	1.37	1.17	1.38

(2) Maximum c-w power output for the frequency under test is obtained when a maximum reading is indicated on the external r-f ammeter. When a 146-ohm dummy antenna is used, the required power outputs are obtained when the r-f output currents are as specified in table XIII.

(3) If the c-w r-f current output is as specified in table XIII, make power output test for unmodulated phone transmission as outlined below (subpars. d(1) through d(6)).

(4) If the c-w current output reading is not as specified in table XIII, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage, and test further to determine the defective part.

(*b*) Make necessary repairs and replacements, and repeat c-w power output test as outlined above (subpars. c(1) through c(3) .

(*c*) Repeat the test for c-w power output in this manner until the performance of the transmitter is satisfactory.

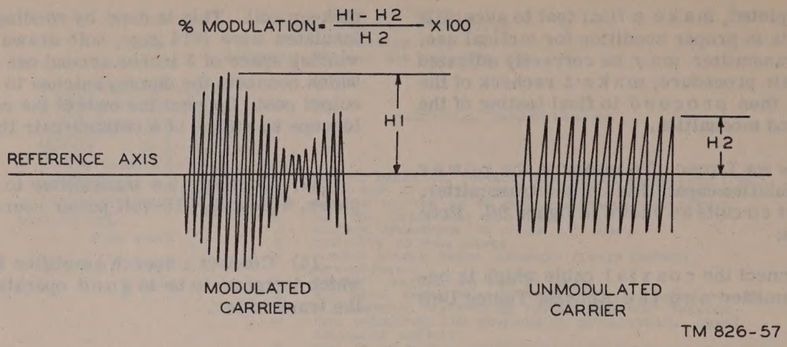


Figure 61. Measuring oscilloscope pattern for modulation percentage test.

d. Power Output Test for Unmodulated Phone Transmission. (1) Remove transmitter Key J-37 from jack J101 on Speech Amplifier BC-614-(*).

(2) Change transmitter operation from c-w to phone transmission (par. 21).

(3) Adjust the transmitter for maximum unmodulated phone power output at the same frequency that was used in the c-w power output test.

(4) The maximum reading on the external r-f ammeter will indicate the maximum unmodulated phone power output current for the frequency under test.

(5) The r-f ammeter reading should at least equal the r-f output current specified in table XIII for unmodulated phone power output.

(6) If the unmodulated phone power output meter reading is as specified in table XIII, make the test for modulation capability as outlined in subparagraphs (1) through (19) below.

(7) If the unmodulated phone power output meter reading is not as specified in table XIII, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage, and test further to determine the defective part.

(*b*) Make necessary repairs and replacements, and repeat the unmodulated phone power output test as outlined in subparagraphs (1) through (6) above.

e. Modulation Capability. (1) Keep the transmitter adjusted for maximum unmodulated phone power output at the same frequency that was used in the previous tests.

(2) Insert the audio signal generator plug into jack J102 on Speech Amplifier BC-614-(*). Have the signal generator turned off.

(3) Turn on the oscilloscope.

(4) Adjust the sweep voltage on the oscilloscope to make the width of the pattern slightly more than half the diameter of the screen.

(5) The unmodulated r-f carrier wave will be seen on the oscilloscope.

(6) The height of the carrier pattern should be approximately one-third of the height of the screen.

(7) Since the height of the carrier pattern depends on the number of turns in the pick-up coil, it may be increased by increasing the number of turns and decreased by decreasing the number of turns of the coil.

(8) Measure the height of the unmodulated r-f wave (fig. 61) above the reference axis.

(9) Adjust the audio signal generator for a frequency of 400 cycles, and turn it on.

(10) Measure the audio input voltage from the audio isgnal generator to Speech Amplifier BC-614-(*), using a high resistance a-c voltmeter or an a-c vacuum-tube voltmeter.

(11) Adjust the audio signal generator for an initial output of .15 volt.

(12) The transmitter output will now be modulated at 400 cycles.

(13) Ninety percent modulation is required for satisfactory operation of the transmitter.

(14) At 90 percent modulation, the r-f current in the external test ammeter will increase approximately 18 percent above the unmodulated value which was obtained in the proceeding test; it should at least equal the r-f output current specified in table XIII for modulated phone power output.

(15) If the value specified in table XIII is not obtained with .15-volt output from the audio signal generator, increase the output of the audio signal generator up to .30 volt, and set the speech amplifier control near maximum to obtain the specified value.

(16) Observe the modulated wave on the oscilloscope screen to make certain that the sine wave pattern remains undistorted.

(17) The maximum height of the modulated wave (H1, fig. 61) as seen on the oscilloscope should be 1.9 times as great as the height (H2) of the unmodulated wave. This indicated a modulation of 90 percent.

(18) If the modulated phone power output reading equals that specified in table XIII, and if, with an audio signal generator output of .30 volt, wave height H1 is 1.9 times as high as wave height H2, without distortion, then the performance of the transmitter is satisfactory.

(19) If it has been impossible to meet the foregoing requirements of this test, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage, and test further to determine the defective part.

(*b*) Make the necessary repairs and replacements, and repeat the test for modulation capability as outlined in subparagraphs e(1) through e(16) above.

f. TESTS FOR ALL BANDS. The foregoing tests present a procedure for testing the c-w power output, the unmodulated phone power output, and the modulation capability in the frequency band 2 to 2.5 mc. Perform these three tests as outlined above on all of the other bands specified in table XIII, testing each band in the order listed.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

72. Repacking for Shipment or Limited Storage

The exact procedure used in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored. Refer to paragraph 12 and reverse the unpacking instructions as far as practicable.

73. Demolition of Material to Prevent Enemy Use

The demolition procedures outlined below will be to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

a. SMASH. Smash the crystals, meters, tubes, coils, switches, capacitors, transformers, and all associated equipment, using sledges, axes, handaxes, pickaxes, hammers, crowbars, or heavy tools.

b. CUT. Cut cords, headsets, and wiring, using axes, handaxes, or machetes.

c. BURN. Burn cords, resistors, capacitors, coils, wiring, instruction books, and calibration charts, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. BEND. Bend panels, cabinet, and chassis.

e. EXPLOSIVES. If explosives are necessary, use firearms, grenades, or TNT.

f. DISPOSAL. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

g. DESTROY. **Destroy Everything.**

APPENDIX I

REFERENCES

For availability of items listed, check SR 310-20-3 and SR 310-20-4. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalog pamphlets.

1. Army Regulations

AR 380-5	Safeguarding Military Information.
AR 750-5	Maintenance of Supplies and Equipment (Maintenance Responsibilities and Shop Operation).

2. Supply Publications

SIG 1	Introduction and Index.
SIG 3	List of Items for Troop Issue.
SIG 5	Stock List of All Items.
SIG 6	Sets of Equipment.
SIG 7&8	Organizational Maintenance and Field And Depot Maintenance Stockage Guide.
SB 11-6	Dry Battery Supply Date.
SB 11-47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SIG 11-76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Publications on Auxiliary Equipment and Test Equipment

NAVSHIPS 91,254	Instruction Book for Tube Tester TV-3/U.
NAVSHIPS 91,272	Oscilloscope OS-8/U.
TM 11-300	Frequency Meter Sets SCR-211-(*).
TM 11-303	Test Sets I-56-C, I-56-D, I-56-H, and I-56-J.
TM 11-321	Test Set I-56-E.
TM 11-472	Repair and Calibration of Electrical Measuring Instruments.
TM 11-2526	Oscilloscope BC-1060-A.
TM 11-2613	Voltohmmeter I-166.
TM 11-2626	Test Units I-176, I-176-A, and I-176-B.
TM 11-2627	Tube Testers I-177 and I-177-A.
TM 11-5527	Multimeter TS-352/U.
TO 16-35TS 382-2	Audio Oscillator TS-382A/U.

4. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TM 9-2851	Painting Instructions for Field Use.

5. Camouflage

FM 5-20	Camouflage, Basic Principles.
TM 5-267	Camouflage.

6. Decontamination

TM 3-220	Decontamination.

7. Demolition

FM 5-25	Explosives and Demolitions.

8. Other Publications

FM 24-18	Field Radio Techniques.
FM 72-20	Jungle Warfare.

SR 310-20-3	Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy-Air Force Publications, and Combined Communications Board Publications).
SR 310-20-4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.
SR 700-45-5	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD-247).
SR 745-45-5) NAVY DEPT) SERIAL) 85P00) AFR 71-4)	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD-66 (Army), SandA-70-6 (Navy), and AF-MC-U2 (Air Force)).
TB SIG 4	Methods for Improving the Effectiveness of Jungle Radio Communication.
TB SIG 5	Defense Against Radio Jamming.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 54	Working Through Jamming with Frequency-Modulated Radio Sets.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TB SIG 223	Field Expedients for Wire and Radio.
TB 11-499-( )[1]	Basic Radio Propagation Predictions.
TM 11-264	Radio Set AN/GRC-26.
TM 11-264A	Radio Set AN/GRC-26A.
TM 11-278	Frequency Shift Exciters 0-39/TRA-7 and 0-39A/TRA-7, Dual Diversity Converters CV-31/TRA-7 and CV-31A/TRA-7, and Control Units C-292/TRA-7 and C-292A/TRA-7.
TM 11-281	Radio Sets SCR-399-A and SCR-499-A.
TM 11-300	Frequency Meter Sets SCR-211-A, B, C, D, E, F, J, K, L, M, N, O, P, Q, R, T, AA, AC, AE, AF, AG, AH, AJ, AK, AL.
TM 11-314	Antennas and Antenna Systems.
TM 11-333	Telephones EE-8, EE-8-A, and EE-8-B.
TM 11-415	Dry Batteries.
TM 11-453	Shop Work.
TM 11-455	Radio Fundamentals.
TM 11-466	Radar Electronic Fundamentals.
TM 11-483	Suppression of Radio Noises.
TM 11-486	Electrical Communication Systems Engineering.
TM 11-490	Electrical Fundamentals.
TM 11-496	Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
TM 11-499	Radio Propagation Handbook.
TM 11-624	Radio Sets AN/MRC-2 and -2A.
TM 11-661	Electrical Fundamentals (Direct Current).

TM 11-850	Radio Receivers BC-312-A, -C, -D, -E, -F, -G, -J, -L, -M, -N, -HX and -NX, BC-342-A, -C, -D, -F, -J, -L, -M, and -N, and BC-314-C, -D, -E, -F, and -G, and BC-344, and -D.
TM 11-904	Power Units PE-95-A, -B, -C, -F, -G, and -H.
TM 11-4000	Trouble Shooting and Repair of Radio Equipment.
TM 11-4043	Speech Amplifiers BC-614-A, -B, -C, -D, -E, and -F, Repair Instructions.
TM 11-5511	Electronic Multimeter TS-505/U.

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[1] A new TB in this series is issued monthly which gives propagation predictions three months in advance.

APPENDIX II
IDENTIFICATION TABLE OF PARTS

NOTE. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O&E, T/A, SIG 7&8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalogs applicable to the equipment covered in this manual are SIG 7&8-BC-610-I. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1, Introduction and Index.

1. Identification Table of Parts for Antenna Tuning Unit BC-939-B

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 2	TUNING UNIT, RF: Sig C antenna Tuning Unit BC-939-B; incl var loading coil, coupling coil, 0 to 15 amp RF meter, vacuum capacitor; steel, painted black; matches output of Radio Transmitter BC-610-( ) to 15 ft whip or lg wire ant over freq range of 2 to 18 mc; 11-1/4 in. lg x 23-1/2 in. d x 14-1/2 in. h; has 4 holes to clear 1/4 in. -20 bolts on 10-1/2 in. x 16-3/8 in. ctrs for mtg on top of Radio Transmitter BC-610-( ). US Army spec 71-1683-A.	Couples transmitter output to whip or long wire antenna.	2C527-939B
C22	CAPACITOR, fixed: vacuum dielectric; 12 uuf ± 1 uuf; 20,000 v AC peak; 28 amp max.	Antenna tuning capacitor.	3D9012-11
C30	CAPACITOR, fixed: vacuum dielectric; sect, 55 uuf -5 uuf + 2 uuf; 32,000 v peak; 28 amp max; 2 metal ferrule terms on ends.	Antenna tuning capacitor.	3D423
	CLIP, electrical: fuse; 3/4 in. jaw opening; Penn Union type #31-60; B & W part #M58.	Clips for vacuum capacitors.	3Z1026-1
L5	COIL, RF: single wnd 5-1/4 turns of #12 tinned copper wire; 2-1/8 in max dia x 4-1/2 in. lg incl shafts; 2 in. OD x 1-11/16 in. lg; B & W part/dwg #X114.	Couples transmitter to antenna tuning unit.	3C302B-3
L44	COIL, RF: single wnd 24 turns #12 tinned copper wire; 2-1/8 in. max dia x 6-5/8 in. lg incl shafts; B & W part/dwg #X113.	H-f loading coil.	3C302B-4
L6	COIL, RF: LF loading; single wnd 61 turns #10 tinned copper wire; 3-1/2 in. max dia x 13-1/4 in. lg incl shafts; B & W part/dwg #X112.	L-f loading coil.	3C302B-2
	COLLAR, shaft: coil, rear; brass, nickel pl; B & W part/dwg M-121.	Holds rear end of h-f coil in place.	2Z2935-19

1. Identification Table of Parts for Antenna Tuning Unit BC-939-B (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	COLLAR, shaft: coil, rear; brass, nickel pl; B & W part/dwg M-8.	Holds rear end of l-f coil in place.	2Z2935-1
	CONTACT, coil: sliding; brass, silver pl; wheel cont w/"V" grove; B & W part/dwg #M103.	Sliding contact on coupling and h-f coils.	2ZA1350-3
	CONTACT, electrical: contains 2 points 7/8 in. wd on 1.665 in. rad; Hallicrafters part/dwg #18A074.	Switch contact for shorting unused turns of l-f rotary coil.	2Z3194-9
	COUNTER, mechanical: direct drive; die cast aluminum; 1-23/64 in. x 27/32 in. x 1-5/32 in. o/a w/shaft extension 7/8 in.; 2 digits counterclockwise rotation; two #6-32 tapped mtg holes on 1-1/8 in. ctr; top row to record ea single revolution and bottom row to record ea 1/10 revolution; Veeder Root part #CB114134; B & W part #M 36-1.	Counter meter for coupling coil.	2Z3263-2
	COUNTER, mechanical: direct drive die cast aluminum; 1-23/64 in. x 27/32 in. x 1-5/32 in. o/a shaft extends 7/8 in.; 3 digits; clockwise rotation; two #6-32 tapped mtg holes on 1-1/8 in. ctrs; 2 top rows recrod ea revolution and bottom row records 1/10 revolution; Veeder Root part #R114144; B & W part #M36.	Counter meter for l-f and h-f coils.	2Z3263-1
	COUPLING, flexible: phosphor bronze springs, nickel pl, ceramic ins, 1/4 in. ID x 2-1/8 in. lg x 2-3/4 in. OD; four #8-32 set screws, 2 on ea end; Cardwell type C; B & W part #M-26.	Couplings for l-f coil and switch shaft.	3G1350-53
	COUPLING, rigid: split flanged type, ins; fits 1/4 in. dia shaft ea end; two #8-32 set screws ea end; 1-3/8 in. dia x 7/8 in. lg; brass, nickel pl; Cardwell #FNF; B & W #M57-1.	For coupling coil shaft.	3G1350-56
	COUPLING, rigid: split flanged type, ins; fits 1/4 in. dia shaft ea end; two #8-32 set screws ea end; 1-3/8 in. dia x 1-3/8 in. lg; brass, nickel pl; Cardwell type #ENF; B & W part #M57.	For h-f coil shafts.	2Z3300-2
	COVER: steel, copper pl; black finish; 21-1/4 in. lg x 0-3/32 in. wd x 13-15/16 in. h; Hallicrafters part/dwg #66D120.	Dust and protective cover for antenna tuning unit.	2Z3351-260
	CRANK ASSEMBLY, hand: HF antenna tuning 1/4 in. dia shaft w/arm and black bakelite handle steel, nickel finish, black bakelite handle; 6 in. lg o/a incl handle, crank offset 1-1/2 in.; inserts through bearing hole; B & W part/dwg #X111.	Tuning crank for h-f coil.	2Z3407.15
	CRANK ASSEMBLY, hand: IF antenna tuning 1/4 in. dia shaft w/arm and black bakelite handle; steel, nickel finish, black bakelite handle; 6-1/2 in. lg o/a incl handle, crank offset 2-1/4 in.; inserts through bearing hole; B & W part/dwg #X110.	Tuning crank for l-f coil.	2Z3407.14

1. Identification Table of Parts for Antenna Tuning Unit BC-939-B (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	HANDLE, crank; 1/2 in. OD x 1-1/2 in. lg x 1/4 in. ID; mts w/special screw thru ID (screw not incl): B & W part/dwg #M30.	Handle for tuning crank assemblies of l-f and h-f coils.	2Z4926.10
	INSULATOR, feedthru: conical round-shank shape; white steatite, glazed; 5/8 in. lg; 5/8 in. OD x .156 in. ID; JAN type NS4W4102.	Part of input terminals (male part).	3G3541-02
	INSULATOR, feedthru: round ctb; white steatite, glazed; 3/8 in. lg; 5/8 in. OD x 3/8 in. ID, 1/4 in. d; JAN type NS4W4202.	Part of input terminals (female part).	3G3542-02.2
	INSULATOR, plate: rectangular flat tube; white ceramic, glazed; 4-7/8 in. lg x 5/16 in. thk; two 5/16 in. dia mtg holes on 4-1/4 in. mtg/c.	Insulation support for h-f and coupling coils.	3G1150-78
	INSULATOR, plate: rectangular flat type; white ceramic, glazed; 8-1/4 in. lg; 7-3/4 in. wd x 1/2 in. thk; two 1/2 in. dia mtg holes on 5-3/4 in. mtg/c.	Insulation support for l-f coil.	3G1150-132
	INSULATOR, stand-off: electrical; Pyrex, clear; 10-1/2 in. lg, 5/8 in. dia.	Slider rod mounting shorting switch contact for l-f rotary coil.	3G1816-74A021
	INSULATOR, stand-off: cyl pillar shape; white ceramic, glazed; 2 in. lg; 1 in. dia; one 1/4 in. -20 thd tapped mtg hole ea end; JAN type NS4W0416.	Insulator for mounting end of vacuum capacitor in l-f coil circuit.	3G3504-16.1
	INSULATOR, stand-off: pillar shape; white ceramic, glazed; 1 in. lg; 3/4 in. sq; one #10-32 tapped mtg hole ea end; JAN type NS4W1208.	Insulator for mounting vacuum capacitor in h-f circuit.	3G3512-08.1
	KNOB: round, fluted; black phenolic; for 1/4 in. dia shaft; two #10-32 set screws; 1-5/8 in. dia x 3/4 in. thk; brass insert; 5/8 in. d shaft hole; Kurz-Kasch #S-309-64BB, w/o pointer.	Coupling coil adjustment knob.	2Z5822-88
	KNOB: round, fluted; black phenolic; for 1/4 in. dia shaft; two #10-32 set screws; 1-5/8 in. x 3/4 in. thk; brass insert; 5/8 in. d shaft hole; vinylite pointer attached; Kurz-Kasch #S-309-64-BB-40263-519.	Antenna range switch SW9	2Z5788-63
M4	METER, ammeter: RF; 0 to 15 amp; JAN type MR34W015RFAA; spec JAN-I-6 w/amend #1.	Antenna current meter.	3F1015-27
	POST, binding: screw type; 1/2 in. dia x 15/10 in. lg, #8-32 stud x 1/2 in. lg; brass, nickel pl.	Antenna and grounding unit case and cover connection.	3Z737-3.4
	SHAFT: glass bonded mica; 3/8 in. sq x 8-19/64 in. lg; 2 holes .150 in. dia, 1/4 in. from ea end; B & W part/dwg #M-303.	Switching shaft for SW9, coupling between sections of three-position switch.	3Z7650-2
	SHAFT: round; cont wheel; brass, silver pl; 1/4 in. dia x 4-1/16 in. lg; 1/4 in. -28 thd ea	Mounting for wheel switch contact on coupling coil.	2Z8203-6

1. Identification Table of Parts for Antenna Tuning Unit BC-939-B (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	end, 1 end drilled and tapped #6-32 x 1/2 in. d; B & W part/dwg #M-104.		
	SHAFT: round; cont wheel; brass, silver pl; 1/4 in. dia x 6-3/16 in. lg; 1/4 in. -28 thd ea end, 1 end drilled and tapped #6-32 x 1/2 in. d; B & W part/dwg #M104-1.	Mounting for wheel switch contact on h-f coil.	2Z8203-73
	SLEEVE, spacer: incl cont shoe, tension spring posts, and flat braid; brass, silver pl; 3-15/16 in. wd x 2-7/8 in. h o/a x 1/8 in. thk; B & W part/dwg X101-2.	Holds and guides switch contact shoe on l-f coil.	2C527-729A/S1
SW9.1 SW9.2	SWITCH, rotary: 2 sect; 3 positions; 4 stator cont in front sect and 3 stator cont in rear.	Antenna range selector, mounts on shaft making up part of switch assembly.	2C527-939A/S4
SW9.1	SWITCH, rotary: 4 stator cont; 3 position incl ceramic plate w/switch cont and shaft bushings; white glazed steatite ins; switch cont, silver graphite on brass stud; rectangular 8-1/4 in. h x 7-3/4 in. wd x 1/2 in thk; mts w/bakelite block and 2 mtg holes to clear #10-32 screws on 2-7/8 in. mtg ctrs; B & W part/dwg #X115.	Coupling circuit selector, front, mounts on shaft which makes up part of the coupling assembly.	3Z9903A-15.1
SW9.2	SWITCH, rotary: incl ceramic plate w/switch cont and shaft bushing; white glazed steatite ins, switch cont silver graphite on brass stud, rectangular, 8-1/4 in. h x 7-3/4 in. wd x 1/2 in. thk; mts w/bakelite block and two mtg holes to clear #10-32 screws on 2-7/8 in. ctrs; B & W part #X116.	Coupling circuit selector, rear, mounts on shaft which is coupled to shaft of SW9.1	3Z9903A-15.2

2. Identification Table of Parts for Radio Transmitter BC-610-I

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 1	TRANSMITTER, radio: Sig C Radio Transmitter BC-610-I; 2 to 18 mc freq range; power output CW 400 w, phone 300 w; input 115 v AC 50 to 60 cyc 2000 w; encl in metal cabinet; 32-1/4 in. lg x 21 in. wd x 39-3/4 in. h; incl 3 sets of plug-in tuning units, two sets of coils, tuning charts, spare tubes, fuses, and lamps.	Transmits c-w or a-m r-f waves.	2C6500I
TS15	BOARD, terminal: w/o term; accom 3 term; stamped w/ckt symbols.	Meter shunt mounting.	3Z770-3.58
TS3	BOARD, terminal: 4-17/32 in. lg x 1-15/16 in. wd x 3/8 in. d; less term; clearance holes for #8 screw on 7/16 in. x 3-15/16 in. mtg/c.	H-v power supply chassis cable connections.	3Z770-6.49
TS13	BOARD, terminal: 5-15/32 in. lg x 1-15/16 in. wd x 3/8 in. d less term; clearance holes for #8 screw on 7/16 in. x 5-1/16 in. mtg/c.	Connects modulator chassis.	2Z9408.134

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
TS7	BOARD, terminal: turret type; 3-1/4 in. lg x 2-3/8 in. wd x 1/2 in. thk o/a.	Resistor and choke mount-	3Z770-8.85
TS2, TS14	BOARD, terminal: 6-19/32 in. lg x 1-15/16 in. wd x 3/8 in. d, less term; clearance holes for #8 screw on 7/16 in. x 6-3/16 in. mtg/c.	TS2: Exciter chassis cable connections. TS14: Cable connection in h-v power supply.	2Z9410.11
TS1, TS9	BOARD, terminal: 7-23/32 in. lg x 15/16 in. wd x 3/8 in. d less term; clearance holes for #8 screw on 7/16 in. x 7-5/16 in. mtg/c.	Cable connections between exciter and modulator chassis.	3Z770-12.40
TS8	BOARD, terminal: 12 turret type term; 5-1/4 in. lg x 2-5/8 in. wd x 1/2 in. thk.	Resistor and choke mounting.	3Z770-12.95
TS11	BOARD, terminal: 8-27/32 in. lg x 1-15/16 in. wd x 3/8 in. d less term; clearance holes for #8 screw on 7/16 in. x 8-7/16 in. mtg/c.	Cable connection from modulator chassis to front panel.	3Z770-14.19
C28	CAPACITOR, fixed: vacuum dielectric; 55 uuf -5 +2 uuf; 32,000 v peak.	Padder for final amplifier.	3D423
C13	CAPACITOR, fixed: mica; 150 uuf ±10%; 500 vdcw; JAN type CM20B151K.	Coupling between tubes V8 and V9.	3K2015121
C29	CAPACITOR, fixed: mica; 220 uuf ±2%; 5000 vdcw; JAN type CM70B221G.	Isolation for h-v neutralizing.	3K7022123
C8	CAPACITOR, fixed: mica; 330 uuf ±10%; 500 vedw; JAN type CM20B331K.	Tube V9 cathode bypass.	3K2033121
C14	CAPACITOR, fixed: mica; 56 uuf ±10%; 2500 vdcw; JAN type CM45B560K.	Coupling between tube V9 and tubes V10 and V11.	
C11	CAPACITOR, fixed: mica; 2000 uuf ±5%; 6000 vdcw.	Tube V16 plate return bypass.	3DA2-217
C6, C7	CAPACITOR, fixed: paper; 2000 uuf ±20%; 1000 vdcw; JAN type CN42A202M.	C6: V11 screen bypass. C7: V10 screen bypass.	3DA2-218
C15	CAPACITOR, fixed: mica; 2200 uuf ±20%; 2500 vdcw; JAN type CM56B222K.	Coupling between tubes V10 and V11 and tube V10.	3K5622221
C1, C2, C3, C5, C25, C30, C31	CAPACITOR, fixed: paper; 6000 uuf ±20%; 600 vdcw; JAN type CN 35A602M.	C1: V8 cathode coupling. C2: V8 screen bypass. C3: V8 cathode return bypass. C5: V8 plate return bypass. C30 and C31: M3 r-f bypasses.	3DA6-67
C4, C24, C26	CAPACITOR, fixed: paper; 6000 uuf ±20%; 1000 vdcw; JAN type CN42A602M.	C4: V9 screen bypass. C24: V10 and V11 plate return bypass. C26: V9 plate return bypass.	3DA6-137
C9, C10	CAPACITOR, fixed: paper; 2 sect; .05 uf +40% -15% ea sect, 600 vdcw; JAN type CP54B-6FF503X.	V16 filament bypasses.	3DA50-157

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C23	✓CAPACITOR, fixed: paper; 2 uf +20%-10%; 4000 vdcw; JAN type CP70E1EM205V.	H-v power supply filter for final amplifier.	3DB2-271
C19	✓CAPACITOR, fixed: paper; 4 uf +20%; 4000 vdcw; JAN type CP70E1EM405V.	H-v power supply filter for final amplifier.	3DB4-346
C20, C21	✓CAPACITOR, fixed: paper; 8 uf +40%-15%; 600 vdcw; JAN type CP70B1FF805X.	Bias power supply filter.	3DB8-226
C16, C17	✓CAPACITOR, fixed; paper; 8 uf +20%-10%; 1000 vdcw; JAN type CF70B1FG805V.	Exciter power supply input filters.	3DB8-225
C18 3	✓CAPACITOR, variable: air; plate meshing type; 3.5 to 5.7 uuf; 3 aluminum plates; 2 solder lug term; adjusting stud w/scdr slot.	Final amplifier neutralizing.	3D9005VE5
C12 3	✓CAPACITOR, variable: air; plate meshing type dual sect; 31 to 151 uuf ea sect; SLC characteristics; extension shaft adj; 46 aluminum plates; stud and lug term.	Plate tuning for final amplifier.	3D9150V-4
	✓CHART: tuning.	Tuning chart for Trans-Tuning Units TU-47 and TU-48.	6D10105-48
	✓CHART: tuning.	Tuning chart for Trans-Tuning Units TU-49 and TU-50.	6D10105-49
	✓CHART: tuning.	Tuning chart for Trans-Tuning Units TU-51 and TU-52.	6D10105-50
	✓CHART: tuning.	Tuning chart for Transmitter Tuning Unit TU-53.	6D10105-51
	✓CHART: tuning.	Tuning chart for Trans-Tuning Unit TU-54.	6D10105-52
H12	✓CLAMP: steel, chrome pl; croname 27050.	Locks p-a plate tuning dial.	2Z2643.65
H15, H15a thru H15e 3	✓CLAMP, electrical: designed to hold material 1-3/8 in. max dia.	Holds electron tubes in sockets.	2Z2642.415
O4 thru O6 3	✓CLIP, electrical: plate cap; silver pl beryllium copper; 59/64 in. lg x 27/64 in. wd x 25/64 in. h; one solder lug connection; for 3/8 in. plate caps.	Provides electrical connection to plates of V4, V5 and V16.	2Z2724
O9 thru O11	CLIP, electrical: 1 in. lg x 3/8 in. h.	Grid connections for electron tubes.	2Z2712.208
O2, O3	CLIP, electrical: plate cap; ceramic w/tin pl beryllium cont; 1-1/8 in. lg x 3/8 in. wd x 9/16 in. h; one solder lug connection.	Provides electrical connection to plates of V10 and V11.	2Z2712.1

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
O7, O8	CLIP, electrical: cad pl brass; 1-3/8 in. lg x 1/2 in. h x 27/32 in. wd; one solder lug connection; for 9/16 in. plate caps.	Provides electrical connections to plates of V6 and V7.	2Z2712
O13, O14	CLIP, electrical: beryllium copper, silver pl; 1-7/32 in. lg x 13/16 in. wd x 3/4 in. h; one #8 screw connection thru base and spring type sliding connection thru ears; Littelfuse part #129001.	For mounting vacuum capacitor C28.	3Z1013.8
CH3 2	COIL, RF: 3 pie universal wnd; unshielded; 2.5 mh, 17.5 ohms; 2-1/8 in. lg x 21/32 in. in. dia; steatite form; 1-3/16 in. lg x 1/4 in. dia; mts by two 2-3/4 in. pigtails.	V8 plate return r-f choke.	3C550-1
CH1, CH2, CH5 3 thru CH8.	COIL, RF: 3 pie universal wnd; unshielded; 1 mh inductance, 10 ohms DC resistance; 2-1/8 in. lg x 9/16 in. dia; steatite form; form 1-1/4 in. lg x 1/4 in. dia; mts by two 2-3/4 in. pigtails; Natl type #R-300.	CH1: V8 grid return r-f choke. CH2: V8 cathode return r-f choke. CH5: V9 plate return r-f choke. CH6: V10 and V11 plate return r-f chokes. CH7: V10 and V11 grid return r-f choke. CH8: V16 grid return r-f choke.	3C363
CH4	COIL, RF: choke; 6 pie universal wnd; unshielded; 2.5 mh, 10 ohms; 2-3/4 in. lg x 31/32 in. die less mtg brackets and solder lugs; steatite form; 2-17/32 in. lg x 15/32 in. dia; mts by #8 screws thru brackets at ea end on 3-1/4 in. ctr; one solder lug at ea end; Millen part #34156.	V16 plate return r-f choke.	3C308-3
CH9	COIL, RF: 1 pie universal wnd; unshielded; 10 my, 70 ohms; 31/32 in. h x 1-1/16 in. dia less solder lugs; steatite form; 3/4 in. x 1/2 in. dia form with 3/16 in. x 1-1/16 in. dia molded on base; mts by #6 screw passing thru clearance hole in ctr of form; 2 solder lugs; Millen part #34210.	V8 cathode return r-f choke.	2C341-10
SO10	CONNECTOR, receptacle: Sig C Socket SO-239; 1 round female cont and shell; straight; 25/32 in. lg on 1 in. x 1 in. base less rear cont; molded mica filled phenolic insert; 4 clearance holes for #4 screws on 23/32 in. x 23/32 in. mtg/c; Amphenol #83-1R.	R-f output connector for coaxial cable.	2Z8799-239
SO6	CONNECTOR, receptacle: 2 male cont, ea about 70 deg of arc; straight type; 1-5/16 in. lg x 1-9/16 in. dia less mtg ears; 20 amp, 250 v; cylindrical nickel pl brass body with molded black bakelite base, locking cont; 2 clearance holes for #10 screws on 2-3/32 in. mtg/c; B&W part #10-72C.	A-c power input.	6Z7560-10

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
SO5 3	✓CONNECTOR, receptacle: 8 female cont, flat yoke shape, pol by key hole in ctr; straight type; 1-1/4 in. dia x 1-1/8 in. lg o/a; cylindrical brass body with cad plate and cronak dip; molded black bakelite insert; mts in 1-1/4 in. dia hole w/1-1/4 in. x 20 thd on mtg end, and w/lockwasher and hex nut opposite end, 1.387 in. -20 thd for cable coupling ring; Amphenol #79-PO8F.	Input connection from speech amplifier.	2Z8678.13
SO7, SO8, SO9	✓CONNECTOR, receptacle: 12 round female cont; pol; straight type.	SO7: Receptacle for channel 1 tuning unit. SO8: Receptacle for channel 2 tuning unit. SO9: Receptacle for channel 3 tuning unit.	2Z3073
O12 3	✓CONNECTOR ASSEMBLY, receptacle: female c/o steatite bar 7-1/2 in. lg x 3/4 in. wd x 5/16 in. thk w/5 holes to mount fittings on 1-1/4 in. ctr, and 2 holes on 6-1/2 in. mtg/c; 3 female cont and two spring type cont ea w/2 tinned solder lug; steatite bar, various metals and finishes; 7-1/2 in. lg 3/4 in. wd x 1-7/16 in. h; B&W part #10574.	Mounts and provides electrical contacts for final amplifier tank coil.	2Z5594.11
O1	✓COUPLING, flexible: steatite base w/phosphor bronze springs; 5000 v peak; cross shaped steatite form with springs mtd on it; 2-1/8 in. x 2-1/8 in. x 1-15/32 in.; mts on two 1/4 in. shafts by means of 2 set screws for ea shaft; B&W part #10-156C.	Connects final tank capacitor C12 to front panel control shaft.	2Z3291-3
I1 2	✓DIAL, control: black bakelite knob w/chrome dial plate; 1-1/16 in. h x 4 in. dia, plate and 2-3/8 in. dia knob; mts on 1/4 in. shaft by 2 set screws; dial plate calibrated 180 deg from 0 to 100 clockwise; B&W part #10-166C.	P. A. PLATE TUNING control.	2Z3764.8
FS5	✓FUSE, cartridge: Sig C Fuse FU-50; opens in 1 hr at 135% load and in 2 min at 200% load, rated continuously at 110% load; 3 amps; 250 v; one time; glass body; ferrule term; 1-1/4 lg x 1/4 in. dia; Littelfuse part #312003; B&W part #10-25C.	Protects T1 and speech amplifier power supply primaries.	3Z1950
FS4	✓FUSE, cartridge: 6 amp opens in 1 hr at 135% load, in 2 min at 200% load, at 110% load, rated continuous; 250 v; one time; glass body; ferrule term; 1-1/4 in. lg x 1/4 in. dia; Littelfuse part #312006; B&W part #10-24C.	Protects T1 through T-5, T103, LM3, and RY1 through RY4.	3Z2606.3
FS3	✓FUSE, plug: 20 amp; 125 v; one time; long time delay; 1-3/16 in. lg x 1-3/16 in. dia o/a; B&W part #10-23C.	Protects T6 primary.	3Z2020
FS1, FS2	✓FUSE, plug: 25 amp; 125 v; one time; long time delay; 1-3/16 in. lg x 1-3/16 in. dia o/a; B&W part #10-22C.	Line fuses.	3Z2025

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
E4, E5	✓ **HOLDER**, fuse: extractor post type; holds one clips; 15 amp, 250 v max; 2-1/4 in. lg x 45/64 in. max dia less rear solder lug; 5/8 in. dia threaded body, for panel hole mtg; two solder lug term; Littelfuse #340030.	E4: Fuseholder for FS4. E5: Fuseholder for FS5.	3Z1939
E16 2	✓ **INSULATOR**, bowl; round ctb shape; 3/8 in. lg o/a; 5/8 in. dia tapered to 1/2 in. OD w/156 in. dia axial hole, ctb 3/8 in. dia x 1/4 in. d from 5/8 in. OD end; JAN type NS4W4202.	Provides for connection to plates of V10 and V11 through exciter chassis from SW11.	3G3542-02.2
E15 2	✓ **INSULATOR**, bushing: conical shape; JAN type NS4W4102.	Provides for connection to plates of V10 and V11 through exciter chassis from SW11.	3G3541-02
E24, E26 2	✓ **INSULATOR**, feedthru: conical shape; cup shape female bushing; steatite, grade L-4, white glazed finish; 1/2 in. lg o/a; 7/8 in. OD x 1/2 in. ID w/.200 in. dia thru hole; JAN type NS4W4203.	B+ voltage feedthrough for modulator chassis.	3G3542-03.1
E19, E20	✓ **INSULATOR**, feedthru: conical shape; JAN type NS4W4204.	R-f output feedthrough insulators.	3G3542-04.1
E23, E25 2	✓ **INSULATOR**, feedthru: conical shape; round male bushing w/extension; steatite, grade L-4, white glazed finish; 7/8 in. lg o/a; 7/8 in. OD x .200 in. ID w/15/32 in. dia shank, 3/8 in. lg; JAN type NS4W4103.	B+ feedthroughs for modulator chassis.	3G3541-03.1
E17, E18	✓ **INSULATOR**, feedthru: conical shape; JAN type NS4W4104.	R-f output feedthrough insulators.	3G3541-04.1
E28	✓ **INSULATOR**, plate: natural phenolic, semi-gloss finish; rectangular flat; 3-1/8 in. lg x 2 in. wd x 1/4 in. thk.	Mounts capacitor C29.	3G320-237
E29	✓ **INSULATOR**, plate: natural phenolic, semi-gloss finish; rectangular flat; 9 in. lg x 3 in. wd x 1/4 in. thk.	Tube socket mounting.	3G320-236
E27	✓ **INSULATOR**, plate: natural phenolic, semi-gloss finish; rectangular plate; 13-3/4 in. lg x 4-1/4 in. wd x 3/8 in. thk.	Mounts tuning capacitor C12.	3G320-238
E10 thru 2 E12, E21, E22	✓ **INSULATOR**, standoff: cylindrical pillar shape; steatite, grade L-4, white glazed finish; .500 in. lg o/a; 3/8 in. dia w/#6-32 hole in ea end 5/32 in. d; JAN type NS4WO104.	Support tie points.	3G3501-04.1
E6 thru 2 E9	✓ **INSULATOR**, standoff: cylindrical; steatite, grade L-4, white glazed; 1 in. lg x 1/2 in. dia; #8-32 thd hole in ea end 3/8 in. d; JAN type NS4WO208.	Component mountings.	3G3502-08.1
E13, E14 2	✓ **INSULATOR**, standoff: conical shape; steatite, grade L-4, white glazed; 1 in. lg o/a; one end	Support plug-in jack bar for final tank coil.	3G3520-08.1

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	1 in. dia, other end 1/2 in. dia, w/#8-32 thd thd hole in ea end 3/8 in. d; JAN type NS4W2008.		
E30	INSULATOR, standoff: paper base phenolic, natural color, white E finish; round, mtg ring; 2-3/4 in. ID x 3-1/2 in. OD x 1/2 in. thk; six #6-32 tapped mtg holes equally spaced on 1.58 in. rad; ID tapers from 3 in. to 2-3/4 in., 3/16 in. d.	Metermounting insulator.	3G350-139
H13, H13.1, H13.2, H13.3	KNOB, round: fluted, skirt type; black bakelite; for 1/4 in. shaft; two #10-32 screws; white line on skirt; 1 in. h x 2-1/16 in. dia; brass insert; 1/2 in. deep shaft hole; B&W part #10-164C.	H13: BANDSWITCH SW11 knob. H13.1: EXCITATION METER SWITCH SW8 knob. H13.2: MODUALTOR BIAS control knob. H13.3: FILAMENT VOLTAGE control knob.	2Z5835
LM2	LAMP, incandescent: Sig C Lamp LM-27; 6 to 8 v, .25 amp; bulb T3-1/4 clear; 1-3/16 in. lg; miniature bayonet base; burn any position; GE part #44; B&W part #10-36C.	Tuning unit compartment illumination.	2Z5927
LM3, LM4	LAMP, incandescent: Sig C Lamp LM-41; 120 v, 6 w; bulb S-6 clear; 1-7/8 in. lg max; candelabra screw base; C-7A tung fil; burn in any position; Mazda part #6S6; B&W part #10-37C.	LM3: Filament on-off indicator. LM4: H-v power supply on-off indicator.	2Z5941
E1 thru E3	LAMPHOLDER; med screw base; ceramic; 660 w, 600 v; 1-7/16 in. h x 2-5/16 in. lg x 1-5/8 in. wd; 2 holes for #8-32 screws on 1-13/16 in. mtg/c; two #8 screw type term; B&W part #10-118C.	E1: Fuseholder for FS1. E2: Fuseholder for FS2. E3: Fuseholder for FS3.	6Z8357-1.1
J1	LAMPHOLDER: miniature bayonet type socket; steel body; 6 to 8 v, .25 amp; 27/32 in. lg x 15/32 in. wd x 1-1/4 in. h excluding solder lugs; two 5/32 in. holes on 15/16 in. mtg/c; mtd by means of 2 clearance holes for #6 screws on ears of U-shaped mtg bracket, two solder lugs at rear coming out opposite sides; Dialco #711; B&W part #10-122C.	Holds LM2.	2Z5883-342
I2	LIGHT, indicator: w/lens; 1-1/8 in. dia green lens with frosted back; for candelabra screw base; brass black nickel pl; 2-3/16 in. lg x 1-1/8 in. dia less lugs; 1-1/32 in. mtg hole req; socket horizontally mtd lamp replaceable from front; threaded jewel; two solder lug term located on opposite sides of bore of socket; Dialco part #51101-XP10-112; B&W part #10-121C.	Filament power on-off indicator.	2Z5988-9
I3	LIGHT, indicator: w/lens; 1-1/8 in. dia red lens with frosted back; for candelabra screw bore; brass black nickel pl; 2-3/16 in. lg x 1-1/8 in. dia less lugs; 1-1/32 in. mtg hole required; socket horizontally mtd lamp re-	Plate power on-off indicator.	2Z5988-5

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	placeable from front; threaded jewel; two solderless lug term located on opposite sides of base of socket; Dialco part #51101-XP10-111; B&W part #10-120C.		
M1 2 ✓	METER, ammeter: DC; 0 to 15 ma; JAN type MR36W015DCMA.	EXCITATION METER.	3F901E5-19
M2 2 ✓	METER, ammeter: DC; 0 to 500 ma; JAN type MR36W500DCMA.	P.A. PLATE meter.	3F950-61
M3 2 ✓	METER, voltmeter: AC; 0 to 10 v; JAN type MR36W010ACW.	FILAMENT VOLTAGE indicator for V16.	3F8010-25
L1 thru L3 ✓	REACTOR: filter choke; one sect; 6 h +20% -10%, .25 amps; 105 ohms ±10%; 2000 v RMS test; HS metal case; 4-1/4 in. h x 3-9/16 in. lg x 3-1/16 in. wd o/a; four #8-32 studs on 2-5/8 in. x 2-1/8 in. mtg/ c; two solder lug term on bottom; B&W part #10-26C.	L1: Exciter power supply filter. L2 and L3: Bias power supply filters.	3C557N
L4 ✓ 3	REACTOR: filter choke; one sect; 11 h min, .5 amp; 67 ohms; 10,000 v RMS test; HS metal case; 9-1/16 in. h x 7 in. lg x 6-1/8 in. wd o/a; four #5/16-18 studs on 4-5/8 in. x 5-9/16 in. mtg/c; two #8-32 stud term on standoff insulators; B&W part #10-28C.	Final amplifier power supply filter.	3C557N-1
RY4 ✓ 2	RELAY, armature: SPST double break normally closed; 5 amp at 125 v AC; single wnd 117 v AC coil; #6 screw term for coil and cont; 3 in. lg x 1-3/4 in. wd x 1-25/32 in. h; clearance holes for #6 screws on 2-3/8 in. x 5/8 in. mtg/c; fast acting; coil impr for tropical use; B&W part #10-69C.	Antenna shorting relay.	2Z7587-223
RY5 ✓ 2	RELAY, armature: DPST; single wnd, 600 ma at 4.2 v DC, ins coil; solder lug term on coil and cont; 2-3/4 in. lg x 1-15/16 in. wd x 1-1/2 in. h; clearance holes for #6 screws on 1-1/4 in. x 1-5/8 in. x 3/4 in. mtg/c; fast acting; coil impr for tropical use; B&W part #10-70C.	Overload protection in h-v power supply.	2Z7588-115
RY3 2 ✓	RELAY, armature: DPDT; .5 amp 2500 v DC cont; single wnd 115 v AC ins coil; #6 screw lug term on cont and coil; 1-5/8 in. h x 2-7/8 in. wd x 3-9/16 in. lg; 4 clearance holes for #6 screw pierced at points of a diamond 2-3/8 in. lg x 1-1/8 in. wd; fast acting; coil impr for tropical use; B&W part #10-88C.	Switching for phone or c-w operation.	2Z7590-188
RY1 ✓	RELAY, armature: DPST normally open; 30 amp at 110 v; single wnd, 125 v AC, 20 w operate, 3.5 w hold, ins coil; metal spacer term tapped for #8-32 screw; 4 in. lg x 3-1/4 in. wd x 3 in. h o/a; 3 clearance holes for #10 screw on 2-9/16 in. x 2-5/16 in. mtg/c; fast acting; coil impr for tropical use; B&W part #10-66C.	Plate power on-off relay.	2Z7599A-326

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
RY2 3	RELAY, armature: DPDT; 5 amp at 117 v; single wnd, 125 v AC, ins coil; solder lug term on coils and cont; 1-9/16 in. h x 2-3/4 in. lg x 1-7/8 in. wd; 4 clearance holes for #6 screws on 2-3/8 in. x 5/8 in. mtg/c; fast acting; coil impr for tropical use; B&W part #10-67C.	Overload protection in h-v power supply.	2Z7590-187
R11	RESISTOR, adjustable: WW; 2500 ohms ±5%; 110 w; WL type #D2500WL.	Bias supply bleeder.	3Z6250-147
R27 2	RESISTOR, fixed: WW; 1752 ohm ±5%; 1/3 w; JAN type RB11BR1752D.	Shunt for meter M1, INT. AMP PLATE position.	3RB1-1752
R26, R33 2	RESISTOR, fixed: WW; .370 ohm ±5%; 1/3 w; JAN type RB11BR3700D.	R26: Shunt for meter M1, P. A. GRID position. R33: Shunt for meter M1, DOUBLER PLATE position.	3RB1-3700
R37	RESISTOR, fixed: WW; 11 ohms ±10%; 300 w; 8-1/2 in. lg x 1-1/4 in. dia; Hallicrafters #24B933.	Series voltage dropping for T6 when SW4 is in HIGH VOLTAGE PROTECT position.	3Z6001A1-20
R21, R22	RESISTOR, fixed: comp; 47 ohms ±10%; 2 w; JAN type RC4BF470K.	R21: Parasitic suppressor for grid of tube V10. R22: Parasitic suppressor for grid of tube V11.	3RC42BF470K
R5	RESISTOR, fixed: WW; 200 ohms ±5%; 12 w; JAN type RW32F201.	Bias resistor to protect tubes V3 and V4.	3RW20120
R28	RESISTOR, fixed: comp; 470 ohms ±10%; 1 w; JAN type RC30BF470K.	Shunt for meter M1, INT. AMP GRID position.	3RC30BF471K
R24	RESISTOR, fixed; WW; 500 ohms ±5%; 10 w; JAN type RW31G501.	V9 cathode bias.	3RW22507
R9	RESISTOR, fixed: WW; 630 ohms ±5%; 18 w; JAN type RW33G631.	Shunt for plate choke on tube V16.	3RW23122
R4	RESISTOR, fixed: comp; 680 ohms ±10%; 1 w; JAN type RC30BF681K.	Part of filter in exciter power supply.	3RC30BF681K
R20	RESISTOR, fixed: WW; 800 ohms ±5%; 10 w; JAN type RW31F801.	Cathode bias for V1 and V2.	3RW23722
R36	RESISTOR, fixed: WW; 2000 ohms ±5%; 12 w; JAN type RW32F202.	Stabilizes plate and screen voltages in tube V9.	3RW26125
R8	RESISTOR, fixed: comp; 4700 ohms ±10%; 2 w; JAN type RC42BF472K.	Grid bias for tubes V10 and V11.	3RC42BF472K
R2	RESISTOR, fixed: WW; 5000 ohms ±5%; 18 w; JAN type RW33G502.	Stabilizes plate voltage on tube V8.	3RW28532
R3	RESISTOR, fixed: WW; 16,000 ohms ±5%; 38 w; JAN type RW35G163.	Stabilizes screen grid voltage of tube V8.	3RW31521

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
R6, R7, R16, R17	RESISTOR, fixed: comp; 22,000 ohms ±10%; 2 w; JAN type RC42BF223K.	R6: Decreases voltage on screen of tube V10. R7: Decreases voltage on screen of tube V11. R16 and R17: Loads for secondary of T8.	3RC42BF223K
R34	✓ RESISTOR, fixed: WW; 25,000 ohms ±5%; 78 w; JAN type RW37G253.	Grid returnfor V3 and V4.	3RW32717
R1, R23	✓RESISTOR, fixed: comp; 33,000 ohms ±10%; 2 w; JAN type RC42BF333K.	R1: V8 grid bias. R23: V9 grid bias.	3RC42BF333K
R10	✓RESISTOR, fixed: WW; 40,000 ohms ±5%; 110 w; JAN type RW38G403.	Bleeder for exciter power supply.	3RW33910
R25	✓RESISTOR, fixed: 47,000 ohms ±10%; 2 w; JAN type RC42BF473K.	V9 screen dropping.	3RC42BF473K
R13	✓RESISTOR, fixed: WW; 80,000 ohms ±10%; WL type D 80000 WL.	Bleeder for final amplifier h-v power supply.	3Z6680-36
R14, R15, R35	✓RESISTOR, fixed: comp; 100,000 ohms ±10%; 1/2 w; JAN type RC20BF104K.	R14 and R15: Loading for secondary of T7. R35: V8 cathode parasitic suppressor.	3RC20BF104K
R18	✓RESISTOR, variable: WW; 1 sect; 15 ohms ±10%; 100 w; JAN type RP251FE150KK.	FILAMENT VOLTAGE control.	3RP3920
R12	✓ RESISTOR, variable: WW; 1 sect; 500 ohms ±10%; 50 w; JAN type RP151FE501KK.	MODULATOR BIAS control.	3RP6919
X16	3 ✓SOCKET, tube: four cont, 50 w; above chassis mtg; two 7/32 in. mtg holes on 2-13/16 in. mtg/c; 3-3/8 in. dia steatite body, 1 in. thk, aluminum indexing ferrule 2 in. OD x 1-5/16 in. h; beryllium copper cont, silver pl; Johnson EF #123-211-11-SB.	Mounts tube V16.	2Z8759.3
X3, X4, X6, X7	✓ 3 SOCKET, tube: four cont, medium bayonet; above chassis mtg; four 3/16 in. mtg holes on 1-5/8 in. x 1-5/8 in. mtg/c; 2-13/16 in. dia steatite body 7/8 in. thk aluminum indexing; phosphor bronze cont, silver pl; Johnson EF #123-209S.	X3: Mounts tube V3. X4: Mounts tube V4. X6: Mounts tube V6. X7: Mounts tube V7.	2Z8759.4-1
X1, X2, X5, X12	✓ 2 SOCKET, tube: four cont medium size; under chassis saddle mtg; two 1/8 in. dia mtg holes on 1-7/8 in. mtg/c; 1-3/8 in. round steatite body 3/8 in. thk excluding term; phosphor bronze cont, silver pl; Natl Co. #CIR-4.	X1: Mounts tube V1. X2: Mounts tube V2. X5: Mounts tube V5. X12: Mounts tube V12.	2Z8757.3
X10, X11	✓SOCKET, tube: 5 cont medium size; under chassis saddle mtg; two 1/8 in. dia mtg holes on 1-7/8 in. mtg/c; 1-3/8 in. round steatite body 3/8 in. thk excluding term; phosphor bronze cont, silver pl; Natl Co. #CIR-5.	X10: Mounts tube V10. X11: Mounts tube V11.	2Z8675.29

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
X8, X9, X13, X14, X15	SOCKET, tube: octal type; under chassis saddle mtg; two .152 in. dia mtg holes on 1-1/2 in. mtg/c; round ceramic body 1-3/16 in. dia x 3/8 in. thk excluding term; phosphor bronze cont, silver pl; Natl Co. Socket-CIR-8, dwg #SD71.	X8: Mounts tube V8. X9: Mounts tube V9. X13: Mounts tube V13. X14: Mounts tube V14. X15: Mounts tube V15.	2Z8678.327
SW2, SW5, SW13 2	SWITCH, interlock: single sect; bakelite body; momentary action; screw term;	Transmitter safety switches (interrupt voltage).	3Z9560-7
SW8 3	SWITCH, rotary: 2 pole, 4 position; 2 decks; silver pl cont; steatite wafers; 2-25/32 in. lg x 1-25/32 in. wd x 1-11/16 in. H; nonshorting; solder lug term; single hole mtg 3/8 in. bushing 1/4 in. lg 1/4 in. shaft, 11/16 in. lg; flush mtd; 60° indexing; B&W part #10-79C.	EXCITATION METER SWITCH.	3Z9825-29.13
SW11 2	SWITCH, rotary: 4 pole, 3 position; 4 decks; silver pl cont; steatite wafers; 9-9/16 in. lg x 1-25/32 in. wd x 1-11/16 in. h; nonshorting; solder lug term; single hole mtg 3/8 in. bushing 1/4 in. lg 1/4 in. shaft 2-1/2 in. lg, flush mtd; B&W part #10-80C.	BAND SWITCH.	3Z9825-62.406
SW6 1	SWITCH, toggle: SPST; JAN type ST42A.	PLATE POWER on-off switch.	3Z9863-42A
SW12 2	SWITCH, toggle: SPST; JAN type ST42B.	OVERLOAD RESET switch.	3Z9863-42B
SW4 1	SWITCH, toggle: DPDT; JAN type ST52N.	HIGH VOLTAGE PROTECT switch.	3Z9863-52N
SW1, SW3 2	SWITCH, toggle: DPST; JAN type ST52K.	SW1: FILAMENT POWER on-off switch. SW3: EXCITER PLATE POWER on-off switch.	3Z9863-52K
SW7 3	SWITCH, toggle: 4 DPT; 15 amp at 125 v inductive load; bakelite case mtd on steel front plate; 2-1/8 in. h x 1-1/2 in. wd x 1-1/2 in. d excluding bat handle; nonshorting; bat handle 7/8 in. lg; #6 screw term; two holes threaded for #6 screws on 1-13/16 in. mtg/c; B&W part #10-78C.	C.W. PHONE switch.	3Z9845-11.5
T7	TRANSFORMER, AF: input type; pri 500 ohms, secd 20,000 ohms CT; HS metal case; 2-3/8 in. h x 1-5/8 in. lg x 1-5/8 in. wd less lugs; freq response 150 to 3000 cyc ± 1/2 db; breakdown test 1,500 v RMS; 5 solder lugs on bottom; two 6-32 studs on bottom; B&W part #10-88C.	Interstage between speech amplifier and grids of tubes V1 and V2.	2Z9631.420
T9	TRANSFORMER, AF: modulation type; pri 21,000 ohms CT, secd 8000 ohms at 250 ma DC 7000 RMS test v; HS metal case; 5-31/32 in. h x 4-21/32 in. lg x 3-31/32 in. wd less term; 250 w max; freq response 150 to 3000 cyc ± 2 db; five 8-32 stud term on ins on	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	2Z9633.68

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	bottom of case; four 1/4-20 studs on 3-11/16 in. x 3 in. mtg/c; B&W part #10-90C.		
T8	TRANSFORMER, AF: plate coupling type; pri 5000 ohms CT, secd 2750 ohms CT 1750 test v; HS metal case; 2-13/16 in. h x 2-23/32 in. lg x 2-23/64 in. wd less term; 15 w; freq response, 150 to 3000 cyc ± 1/2 db; four solder lug term on bottom; four 6-32 studs on 2-1/8 in. x 1-3/4 in. mtg/c; B&W part #10-89C.	Couples plates of driver tubes V1 and V2 to grids of modulator tubes V3 and V4.	2Z9632.636
T3	TRANSFORMER, power: fil type; input 100 v, 115 v, 50 to 60 cyc, single ph; one output wnd; secd 5 v at 12.6 ampCT; 1500 v ins; HS metal case; 3-27/32 in. h x 3-9/16 in. lg x 3-1/16 in. wd excluding term; 6 solder lug term on bottom of case; four 8-32 studs on 2-1/8 in. x 2-5/8 in. mtg/c; B&W part #10-84C.	Filament supply for tubes V3 and V4.	2Z9621-203
T2	TRANSFORMER, power: fil type; input 100 v, 115 v, 50 to 60 cyc, single ph; one output wnd; secd 2.5 v at 10 amp CT; secd to core, 10,000 v insulation, pri to core, 1750 v insulation; HS metal case; 4-7/8 in. h x 3-9/16 in. lg x 3-1/16 in. wd; 6 solder lug term on bottom; four 8-32 studs on 2-1/8 in. x 2-5/8 in. mtg/c; B&W part #10-83C.	Filament supply for tubes V6 and V7.	2Z9621-201
T4	TRANSFORMER, power: fil type; input 100 v, 115 v, 50 to 60 cyc, single ph; 3 output wnd; secd #1 5.0 v at 10.5 amp CT, secd #2 6.3 v at 3.5 amp CT, secd #3 5 v at 3 amp CT; 2000 v insulation; HS metal case; 4-15/32 in. h x 4-9/32 in. lg x 3-11/32 in. wd excluding term; 12 solder lug term on bottom; four 10-32 studs on 3-5/16 in. x 2-11/16 in. mtg/c; B&W part #10-85C.	Filament supply for tubes V8 through V12 and tube V16.	2Z9621-202
T1	TRANSFORMER, power: fil and plate type; input 117 v, 50 to 60 cyc, single ph; 3 output wnd; secd #1, 1000 v at 220 ma CT; secd #2, 2.5 v at 5 amp CT, secd #3, 5.0 v at 3 amp CT; 1750 v insulation; HS metal case; 4-29/32 in. h x 4-21/32 in. lg x 3-31/32 in. wd; 11 solder lug term on bottom; four 1/4 -20 studs on 3 in. x 3-11/16 in. mtg/c; B & W part #10-82C.	Filament supply for tubes V1, V2, and V5 and bias voltage supply.	2Z9621-200
T5	TRANSFORMER, power: plate type; input 115 v, 125 v 50 to 60 cyc, single ph; one output wnd; secd 870 v at 250 ma DC CT; 2000 v insulation; HS metal case; 4-29/32 in. h x 4-21/32 in. lg x 3-31/32 in. wd less term; 6 solder lug term on bottom; four 1/4 -20 studs on 3-11/16 in. x 3 in. mtg/c; B & W part #10-86C.	Plate transformer of exciter power supply.	2Z9621-204
T6	TRANSFORMER, power: plate type; input 117 v, 50 to 60 cyc, single ph, two wnd w/taps to provide 5760 v, CT or 4800 v CT, when connected in parallel and 2880v CT or 2400 v CT	Plate transformer for h-v power supply.	2Z9621-205

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	when connected in series; one output wnd; secd 5760 v at 321 ma CT or 4800 v at 475 ma CT; 10,000 v RMS insulation; HS metal case; 8-7/32 in. h x 10-23/32 in. lg x 9-7/32 in. wd less term; six solder lug term and three 1/4 -20 screw term on bottom: four 3/8 -16 studs on 8-3/4 in. x 7 in. mtg/c; B & W part #10-87C.		
L7A ✓	TRANSFORMER, RF: Sig C Coil Unit C-387-D; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 32 turns of #15 B & W wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-29C.	Final amplifier plate tank coil, 2- to 3.5-mc frequency range.	3C280-387D
L7B ✓	TRANSFORMER, RF: Sig C Coil Unit C-388-C; plug-in type; two wnd; single layer wnd, secd rotatable; unshielded; pri 24 turns of #12 B & S wire, secd 4-1/2 turns on #15 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-30C.	Final amplifier plate tank coil, 3.5- to 4.5-mc frequency range.	3C280-288C
L7C ✓	TRANSFORMER, RF: Sig C Coil Unit C-389-C; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 18 turns of #12 B & S wire, secd 4-1/2 turns on #15 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-31C.	Final amplifier plate tank coil, 4.5- to 5.7-mc frequency range.	3C280-389C
L7D ✓	TRANSFORMER, RF: Sig C Coil Unit C-290-C; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 14 turns of #12 B & S wire, secd 4-1/2 turns of #15 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-32C.	Final amplifier plate tank coil, 5.7- to 8-mc frequency range.	3C300-390C
L7E ✓	TRANSFORMER, RF: Sig C Coil Unit C-447-B; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 10 turns of #9 B & S wire, secd 4-1/2 turns of #13 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-33C.	Final amplifier plate tank coil, 8- to 11-mc frequency range.	3C300-447B
L7F ✓	TRANSFORMER, RF: Sig C Coil Unit C-448-B; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 8 turns of #7 B & S wire, secd 2-1/2 turns of #13 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-34C.	Final amplifier plate tank coil, 11- to 14-mc frequency range.	3C3000-448B

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
L7G ✓	TRANSFORMER, RF: Sig C Coil Unit C-449-B; plug-in type; two wnd, single layer wnd, secd rotatable; unshielded; pri 6 turns of #7 B & S wire, secd 1-1/2 turns of #13 B & S wire; 5-1/2 in. lg x 5 in. wd x 6 in. h; air core; mts on 5 banana plugs on 1-1/4 in. mtg/c; 5 banana plug term on bottom; B & W part #10-35C.	Final amplifier plate tank coil, 14- to 18-mc frequency range.	3C300-449B
V13, ✓ V14, ✓ V15 ✓	TUBE, electron: diode; gas filled; JAN type OD3.	V13: V8 screen voltage regulator. V14 and V15: V8 plate voltage regulators.	2JOD3
V1, V2 ✓	TUBE, electron: triode; JAN type 2A3.	Audio amplifiers.	2J2A3
V6, V7 ✓	TUBE, electron: diode; gas filled; JAN type 3B28.	H-v power supply rectifiers.	2J3B28
V5, V12 ✓	TUBE, electron: duo-diode; JAN type 5Z3.	V5: Bias supply rectifier. V12: Exciter supply rectifier.	2J5Z3
V9 ✓	TUBE, electron: tetrode; JAN type 6L6Y.	Buffer and doubler.	2J6L6Y
V8 ✓	TUBE, electron: tetrode; JAN type 6V6Y.	R-f oscillator.	2J6V6Y
V3, V4 ✓	TUBE, electron: triode; JAN type 100TH.	Class B modulators.	2J100TH
V16 ✓	TUBE, electron: triode; JAN type 250TH.	Final r-f power amplifier.	2J250TH
V10, V11 ✓	TUBE, electron: tetrode; JAN type 807.	Intermediate amplifiers.	2J807
U1 ✓	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-47; steel case cad pl w/iridite dip, knobs, and xtal socket molded phenolic; freq range 2 to 2.5 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-91C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8047
U2 ✓	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-48; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 2.5 to 3.2 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-92C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8048
U3 ✓	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-49; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 3.2 to 4 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-93C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8049
U4 ✓	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-50; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq	Tuning of oscillator, doubler, and intermediate amplifier.	2C8050

2. Identification Table of Parts for Radio Transmitter BC-610-I (cont'd)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	range 4 to 5 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-94C.		
U5	✓TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-51; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 5 to 6.35 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-1/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-95C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8051
U6	✓TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-52; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 6.35 to 8 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-96C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8052
U7	✓TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-53; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 8 to 12 mc; 6-1/8 in. h x 9-1/16 in. lg x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-97C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C9053
U8	✓TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU-54; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq x 1-15/16 in. wd approx; plugs into a special 12-cont socket; B & W part #10-98C.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8054

3. Identification Table of Parts for Transmitter Tuning Units

a. Transmitter Tuning Unit TU-47.

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-47: var cap tuned; 2 to 2.5 mc tuning range; metal case; 1 male receptacle term; 9-1/8 in. lg x 6-1/8 in. h x 2 in. wd; plug-in mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8047
C42	CAPACITOR, fixed: ceramic; 39 uuf ±5%; 500 vdcw.	Grid coupling.	3D9039-34
C47	CAPACITOR, fixed: mica; 75 uuf ±5%; 500 vdcw; JAN type CM20B750J.	Crystal coupling.	3K2075022
C36	CAPACITOR, fixed: ceramic; 130uuf ±2%; 500 vdcw; JAN type CC35PH131G.	Master oscillator padding.	3D9130-14
C44	CAPACITOR, fixed: mica; 240 uuf ±5%; 500 vdcw; JAN type CM20B241J.	Cathode coupling.	3K2024122
C31, C32	CAPACITOR, variable; plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	C31: Master oscillator tuning. C32: Buffer-doubler tuning.	3K9143V

a. TRANSMITTER TUNING UNIT TU-47. (contd.)

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C34	CAPACITOR, variable: plate meshing type; 11.5 uuf to 150 uuf; 1000 v AC peak.	Intermediate amplifier	3D9150V-14
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L20 L26	COIL, RF: doubler-buffer; 2 to 2.5 mc; 1 wnd.	L20: Buffer-doubler tuning. L26: Intermediate-amplifier tuning.	3C1090-12
L8	COIL, RF: 2 to 2.5 mc; 1 wnd.	Master oscillator tuning.	3C1090
L14	COIL, RF: xtal osc; 2 to 2.5 mc; 1 wnd.	Crystal oscillator inductor.	3C1090-6
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M. O. operation.	3Z9858-3.1

b. TRANSMITTER TUNING UNIT TU-48.

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-48: var cap tuned; 2.5 to 3.2 mc tuning range; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8048
C43	CAPACITOR, fixed: 51 uuf ±5%; 500 vdcw; JAN type CC32CH510J.	Grid coupling.	3D9051-50
C37	CAPACITOR, fixed: ceramic; 160 uuf ±5%; 500 vdcw; JAN type CC35PH161J.	Master oscillator padding.	3D9160-6
C45	CAPACITOR, fixed: mica; 390 uuf ±10%; 500 vdcw; JAN type CM20B391K.	Cathode coupling.	3K2039121
C33	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 600 v RMS test; JAN type CT1B100.	Buffer-doubler tuning.	3D9099V-5

b. TRANSMITTER TUNING UNIT TU-48. (contd.)

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
C35	CAPACITOR, variable: plate meshing type; 7.5 to 99 uuf; 800 v RMS test; JAN type CT2C100.	Intermediate amplifier tuning.	3D9100V-9
C31	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	Master oscillator tuning.	3D9143V
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L21, L27	COIL, RF: IPA and buffer-doubler; 2.5 mc to 3.2 mc; 1 wnd.	L21: Buffer-doubler tuning. L27: Intermediate-amplifier tuning.	3C1090-13
L9	COIL, RF: MO; 2.5 mc to 3.2 mc; universal wnd; 70 turns copper wire tapped at 25 turns.	Master oscillator tuning.	3C1090-1
L15	COIL, RF: xtal osc; 2.5 mc to 3.2 mc range; single layer, 62 turns.	Crystal oscillator inductor.	3C1090-7
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122-11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

c. TRANSMITTER TUNING UNIT TU-49.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-49: var cap tuned; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8049
C43	CAPACITOR, fixed: 51 uuf ±5%; 500 vdcw; JAN type CC32CH510J.	Grid coupling.	3D9051-50
C38	CAPACITOR, fixed: ceramic; 130 uuf ±5%; 500 vdcw; JAN type CC35PH131J.	Master oscillator padding.	3D9130-13

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
C33	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 600 v RMS test; JAN type CT1B100.	Buffer-doubler tuning.	3D9099V-5
C35	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 800 v RMS test; JAN type CT2C100.	Intermediate amplifier tuning.	3D9100V-9
C31	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	Master oscillator tuning.	3D9143V
	CLAMP, electrical: disk tumbler: black index line in ctr.	Locking device on master	2Z6195.9
L22, L28	COIL, RF: buffer-doubler; 1 wnd; 30 turns copper wire.	L22: Buffer-doubler tuning. L28: Intermediate amplifier tuning.	3C1090-14
L10	COIL, RF: MO; 3.2 mc to 4 mc; 1 wnd; 56 turns copper wire, tapped at 19-1/2 turns.	Master oscillator tuning.	3C1090-2
L16	COIL, RF: xtal osc; 3.4 mc to 4 mc; 1 wnd; 35 turns copper wire.	Crystal oscillator inductor.	3C1090-8
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	
	DIAL, control: knob type; marked "0-100" deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672-25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

d. TRANSMITTER TUNING UNIT TU-50.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-50: var cap tuned; 4 mc to 5 mc tuning range; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8050
C43	CAPACITOR, fixed: 51 uuf ±5%; 500 vdcw; JAN type CC 32CH510J.	Grid coupling.	3D9051-50
C46	CAPACITOR, fixed: mica; 100 uuf ±10%; 500 vdcw; JAN type CM20B101K.	Cathode coupling.	3K2010121

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
C39	CAPACITOR, fixed: ceramic; 180 uuf ±2%; 500 vdcw; JAN type CC35PH181G.	Master oscillator padding.	3D9180-24
C33	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 600 v RMS test; JAN type CT1B100.	Buffer-doubler tuning.	3D9099V-5
C35	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 800 v RMS test; JAN type CT2C100.	Intermediate amplifier tuning.	3D9100V-9
C31	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN CT1B150.	Master oscillator tuning.	3D9143V
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L23, L29	COIL, RF: buffer-doubler; 4 mc to 5 mc; 1 wnd; 25 turns copper wire.	L23: Buffer-doubler tuning. L29: Intermediate amplifier tuning.	3C1090-15
L11	COIL, RF: MO; 4 mc to 5 mc; 1 wnd; 35 turns copper wire.	Master oscillator tuning.	3C1090-3
L17	COIL, RF: xtal osc; 4 mc to 5 mc; 1 wnd; 96 turns copper wire.	Crystal oscillator inductor.	3C1090-9
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

e. TRANSMITTER TUNING UNIT TU-51.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-51: var cap tuned; 5 mc to 6.35 mc tuning range; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8051

e. TRANSMITTER TUNING UNIT TU-51. (contd.)

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
C42	CAPACITOR, fixed: ceramic; 39 uuf ±5%; 500 vdcw.	Grid coupling.	3D9039-34
C40	CAPACITOR, fixed: ceramic; 160 uuf ±5%; 500 vdcw; JAN type CC35RH161J.	Master oscillator padding.	3D9160-4
C45	CAPACITOR, fixed: mica; 390 uuf ±10%; 500 vdcw; JAN type CM 20B391K.	Cathode coupling.	3K2039121
C33	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 600 v RMS test; JAN type CT1B100.	Buffer-doubler tuning.	3D9099V-5
C35	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 800 v RMS test; JAN type CT2C100.	Intermediate amplifier tuning.	3D9100V-9
C31	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	Master oscillator tuning.	3D9143V
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L24, L30	COIL, RF: buffer-doubler; 5 mc to 6.35 mc; 1 wnd; 19 turns copper wire.	L24: Buffer-doubler tuning. L30: Intermediate amplifier tuning.	3C1090-16
L12	COIL, RF: MO; 5 mc to 6.35 mc; 1 wnd; 40 turns copper wire.	Master oscillator tuning.	3C1090-4
L18	COIL, RF: xtal osc; 5 mc to 6.35 mc; 1 wnd; 73 turns copper wire.	Crystal oscillator inductor.	3C1090-10
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

f. TRANSMITTER TUNING UNIT TU-52.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-52: var cap tuned; 6.35 mc to 8 mc tuning range; aluminum case; 12 term male receptacle; 9-1/32 lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8052
C42	CAPACITOR, fixed: ceramic; 39 uuf ±5%; 500 vdcw.	Grid coupling.	3D9039-34
C41	CAPACITOR, fixed: ceramic; 180 uuf ±5%; 500 vdcw; JAN type CC35PH181J.	Master oscillator padding.	3D9180-13
C45	CAPACITOR, fixed: mica; 390 uuf ±10%; 500 vdcw; JAN type CM20B391K.	Cathode coupling.	3K2039121
C33	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 600 v RMS test; JAN type CT1B100.	Buffer-doubler tuning.	3D9099V-5
C35	CAPACITOR, variable: plate meshing type; 7.5 uuf to 99 uuf; 800 v RMS test; JAN type CT2C100.	Intermediate amplifier tuning.	3D9100V-9
C31	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	Master oscillator tuning.	3D9143V
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L25, L31	COIL, RF: buffer-doubler; 6.35 mc to 8 mc; 1 wnd; 14 turns copper wire.	L25: Buffer-doubler tuning. L31: Intermediate amplifier tuning.	3C1090-17
L13	COIL, RF: MO; 6.35 mc to 8 mc; 1 wnd; 28 turns copper wire.	Master oscillator tuning.	3C1090-5
L19	COIL, RF: xtal osc; 6.35 mc to 8 mc; 1 wnd; 60 turns copper wire.	Crystal oscillator inductor.	3C1090-11
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

g. TRANSMITTER TUNING UNIT TU-53.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-53: var cap tuning; 8 mc to 12 mc tuning; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8053
C42	CAPACITOR, fixed: ceramic; 39 uuf ±5%; 500 vdcw.	Grid leak capacitor.	3D9039-34
C48	CAPACITOR, fixed: ceramic; 62 uuf ±5%; 500 vdcw; JAN type CC32PH620J.	Master oscillator padding.	3D9062-10
C44	CAPACITOR, fixed: mica; 240 uuf ±5%; 500 vdcw; JAN type CM20B241J.	Cathode coupling.	3K2024122
C31, C32	CAPACITOR, variable: plate meshing type; 9 uuf to 143 uuf; 600 v RMS test; JAN type CT1B150.	C31: Master oscillator tuning. C32: Buffer-doubler tuning.	3D9143V
C34	CAPACITOR, variable: plate meshing type; 11.5 uuf to 150 uuf; 1000 v AC peak.	Intermediate amplifier tuning.	3D9150V-14
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L33, L34	COIL, RF: resonates at 9.92 mc; 1 wnd; 10 turns copper wire.	L33: Buffer-doubler tuning. L34: Intermediate amplifier tuning.	3C1094P-5
L32	COIL, RF: MO; 8 mc to 12 mc; 1 wnd; 35 turns copper wire tapped at 11-1/2 turns.	Master oscillator tuning.	3C4055-1
L41	COIL, RF: xtal; 8 mc to 12 mc; 1 wnd; 32 turns copper wire.	Crystal oscillator inductor.	3C1084-1
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black.	Manual adjustment for doubler and intermediate amplifier.	2Z5849.8
R29, R30	RESISTOR, fixed: comp; 3300 ohm ±10%; 1/2 w; JAN type RC20BF333K.	R29: Master oscillator grid leak. R30: Crystal oscillator grid leak.	3RC20BF333K
	SOCKET, crystal: 5/32 in. dia pins accom, 3/4 in. c to c.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M.O. operation.	3Z9858-3.1

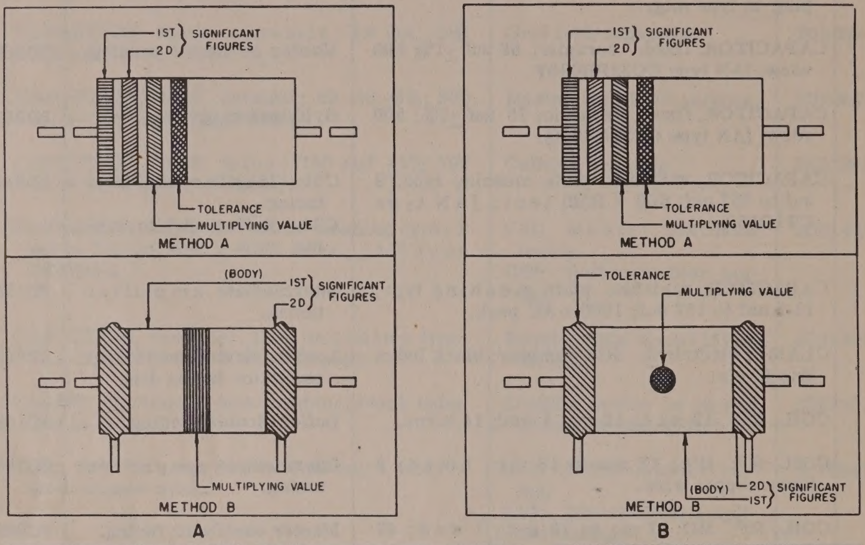
b. TRANSMITTER TUNING UNIT TU-54.

Ref. Symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-54: var cap tuning; 12 mc to 18 mc tuning range; aluminum case; 12 term male receptacle; 9-1/32 in. lg x 1-7/8 in. wd x 5-5/8 in. h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8054
C49	CAPACITOR, fixed: ceramic; 68 uuf ±1%; 500 vdcw; JAN type CC32PH680F.	Master oscillator padding.	3D9068-19
C50	CAPACITOR, fixed: ceramic; 75 uuf ±5%; 500 vdcw; JAN type CC32PG750J.	Grid leak capacitor.	3D9075-31
C31, C32	CAPACITOR, variable: plate meshing type; 9 uuf to 153 uuf; 600 v RMS test; JAN type CT1B150.	C31: Master oscillator tuning. C32: Buffer-doubler tuning.	3D9143V
C34	CAPACITOR, variable: plate meshing type; 11.5 uuf to 150 uuf; 1000 v AC peak.	Intermediate amplifier tuning.	3D150V-14
	CLAMP, electrical: disk tumbler; black index line in ctr.	Locking device on master oscillator tuning dial.	2Z6195.9
L36	COIL, RF: 12 mc to 18 mc; 1 wnd; 14 turns.	Buffer-doubler tuning.	3C1084P
L37	COIL, RF: IPA; 12 mc to 18 mc; 1 wnd; 9 turns copper wire.	Intermediate amplifier tuning.	3C1084P-7
L35	COIL, RF: MO; 12 mc to 18 mc; 1 wnd; 47 turns copper wire.	Master oscillator tuning.	2C8054/C2
L42	COIL, RF: xtal; 12 mc to 18 mc; 1 wnd; 50 turns copper wire.	Crystal oscillator inductor.	3C1084P-6
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
	DIAL, control: knob type; marked "0-100" in 180 deg, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB; round; black.	Manual adjustment for doubler, and intermediate amplifier.	2Z5849.8
R31, R32	RESISTOR, fixed: comp; 33,000 ohm ±10%; 1/2 w; JAN type RC20BF333K.	R31: Crystal oscillator grid leak. R32: Master oscillator grid leak.	3RC20BF333K
	SOCKET, crystal: 5/32 in. pins accom, 3/4 in.	Mounts crystal.	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N.	Switching for XTAL or M. O. operation.	3Z9858-3.1

RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS*

JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS†


1ST
2D
SIGNIFICANT FIGURES
TOLERANCE
MULTIPLYING VALUE
METHOD A
(BODY)
1ST
2D
SIGNIFICANT FIGURES
MULTIPLYING VALUE
METHOD B
A
1ST
2D
SIGNIFICANT FIGURES
TOLERANCE
MULTIPLYING VALUE
METHOD A
TOLERANCE
MULTIPLYING VALUE
(BODY)
2D
1ST
SIGNIFICANT FIGURES
METHOD B
B

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)
BLACK	0	1	± –
BROWN	1	10	± 1
RED	2	100	± 2
ORANGE	3	1,000	± 3
YELLOW	4	10,000	± 4
GREEN	5	100,000	± 5
BLUE	6	1,000,000	± 6
VIOLET	7	10,000,000	± 7
GRAY	8	100,000,000	± 8
WHITE	9	1,000,000,000	± 9
GOLD	–	0.1	± 5
SILVER	–	0.01	± 10
NO COLOR	–	–	± 20

NOTES

* INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A NATURAL TAN BACKGROUND COLOR. NON-INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A BLACK BACKGROUND.

† RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.

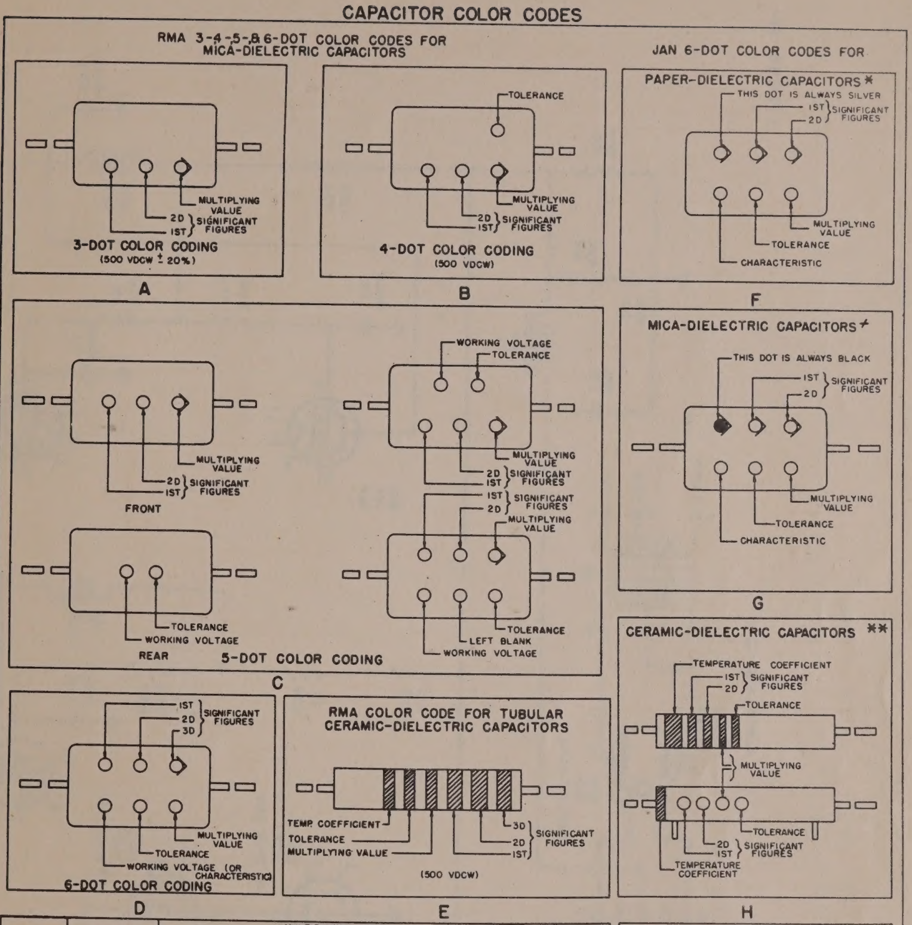
RMA: RADIO MANUFACTURERS ASSOCIATION

JAN: JOINT ARMY-NAVY

THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS

TL 32454S

Figure 62. Resistor color codes.


CAPACITOR COLOR CODES
RMA 3-4-5-& 6-DOT COLOR CODES FOR MICA-DIELECTRIC CAPACITORS
MULTIPLYING VALUE
2D
1ST
SIGNIFICANT FIGURES
3-DOT COLOR CODING
(500 VDCW ± 20%)
A
TOLERANCE
MULTIPLYING VALUE
2D
1ST
SIGNIFICANT FIGURES
4-DOT COLOR CODING
(500 VDCW)
B
JAN 6-DOT COLOR CODES FOR
PAPER-DIELECTRIC CAPACITORS *
THIS DOT IS ALWAYS SILVER
1ST
2D
SIGNIFICANT FIGURES
MULTIPLYING VALUE
TOLERANCE
CHARACTERISTIC
F
MULTIPLYING VALUE
2D
1ST
SIGNIFICANT FIGURES
FRONT
TOLERANCE
WORKING VOLTAGE
REAR
WORKING VOLTAGE
TOLERANCE
MULTIPLYING VALUE
2D
1ST
SIGNIFICANT FIGURES
1ST
2D
SIGNIFICANT FIGURES
MULTIPLYING VALUE
TOLERANCE
LEFT BLANK
WORKING VOLTAGE
5-DOT COLOR CODING
C
MICA-DIELECTRIC CAPACITORS ✝
THIS DOT IS ALWAYS BLACK
1ST
2D
SIGNIFICANT FIGURES
MULTIPLYING VALUE
TOLERANCE
CHARACTERISTIC
G
1ST
2D
3D
SIGNIFICANT FIGURES
MULTIPLYING VALUE
TOLERANCE
WORKING VOLTAGE (OR CHARACTERISTIC)
6-DOT COLOR CODING
D
RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS
TEMP. COEFFICIENT
TOLERANCE
MULTIPLYING VALUE
3D
2D
1ST
SIGNIFICANT FIGURES
(500 VDCW)
E
CERAMIC-DIELECTRIC CAPACITORS **
TEMPERATURE COEFFICIENT
1ST
2D
SIGNIFICANT FIGURES
TOLERANCE
MULTIPLYING VALUE
TOLERANCE
2D
1ST
SIGNIFICANT FIGURES
TEMPERATURE COEFFICIENT
H

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			RMA VOLTAGE RATING
		RMA MICA-AND CERAMIC-DIELECTRIC	JAN MICA-AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	-
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	1,000	1,000	300
YELLOW	4	10,000	10,000		400
GREEN	5	100,000			500
BLUE	6	1,000,000			600
VIOLET	7	10,000,000			700
GRAY	8	100,000,000		0.01	800
WHITE	9	1,000,000,000		0.1	900
GOLD	-	0.1	0.1		1,000
SILVER	-	0.01	0.01		2,000
NO COLOR	-				500

NOTES

* THE SILVER DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

✝ THE BLACK DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. EITHER THE BAND OR DOT CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.

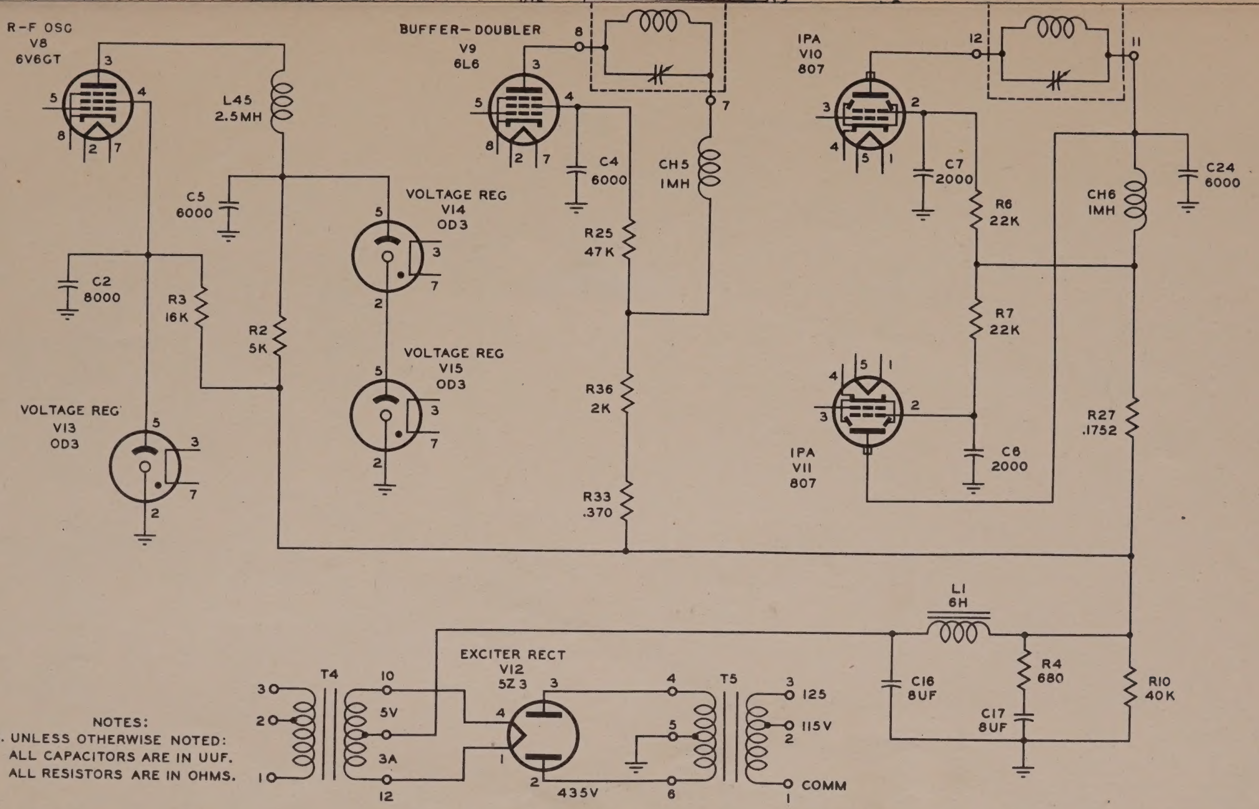
RMA: RADIO MANUFACTURERS ASSOCIATION

JAN: JOINT ARMY-NAVY

THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

TL 324535

Figure 63. Capacitor color codes.


R-F OSC
V8
6V6GT
L45
2.5MH
C5
6000
C2
8000
R3
16K
R2
5K
VOLTAGE REG
V13
OD3
BUFFER–DOUBLER
V9
6L6
C4
6000
CH5
IMH
R25
47K
R36
2K
R33
.370
VOLTAGE REG
V14
OD3
VOLTAGE REG
V15
OD3
IPA
V10
807
C7
2000
R6
22K
R7
22K
C8
2000
IPA
V11
807
CH6
IMH
C24
6000
R27
.1752
L1
6H
C16
8UF
R4
680
C17
8UF
R10
40K
T4
5V
3A
EXCITER RECT
V12
5Z3
435V
T5
125
115V
COMM

NOTES:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

EXCITER B+

TM 826-39

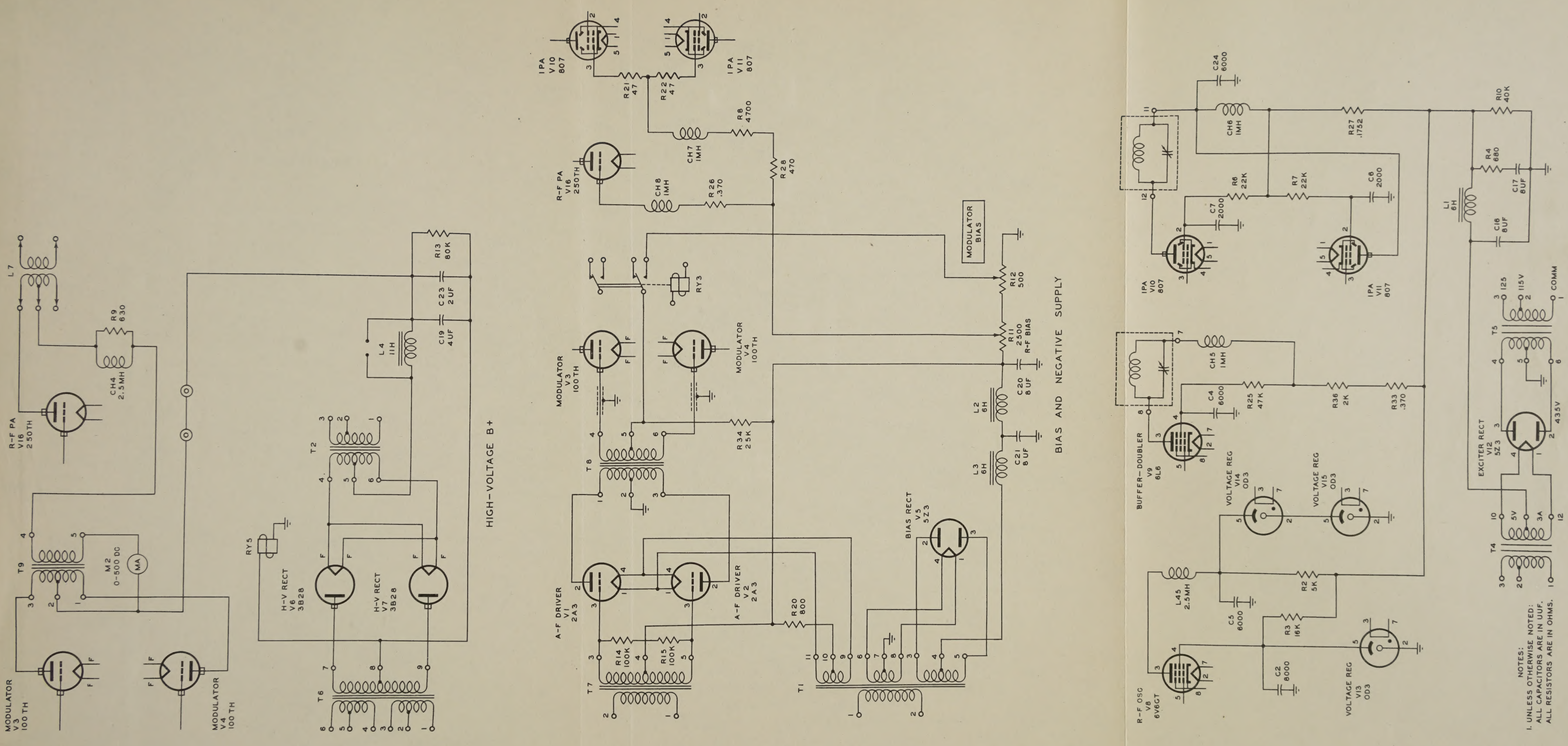
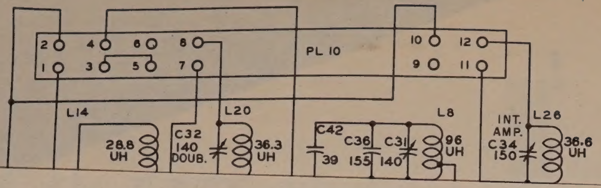
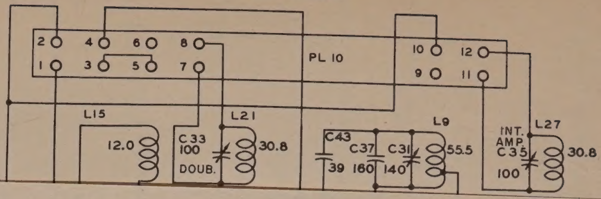

HIGH-VOLTAGE B+
R-F PA V16 250TH
MODULATOR V3 100TH
MODULATOR V4 100TH
L7
R9 630
CH4 2.5MH
T9
M2 0-500 DC
MA
RY5
H-V RECT V6 3B28
H-V RECT V7 3B28
T2
T6
L4 11H
C19 4UF
C23 2UF
R13 80K
BIAS AND NEGATIVE SUPPLY
IPA V10 807
IPA V11 807
R21 47
R22 47
R8 4700
CH7 1MH
R28 470
R-F PA V16 250TH
CH8 1MH
R26 .370
RY3
MODULATOR V3 100TH
MODULATOR V4 100TH
MODULATOR BIAS
R12 500
R11 2500 R-F BIAS
C20 8UF
L2 6H
C21 8UF
L3 6H
R34 25K
T8
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
R14 100K
R15 100K
T7
R20 800
BIAS RECT V5 5Z3
T1
EXCITER B+
C24 6000
CH6 1MH
R27 .1752
R10 40K
R4 680
C17 8UF
R6 22K
R7 22K
C6 2000
C7 2000
L1 6H
C16 8UF
IPA V10 807
IPA V11 807
CH5 1MH
C4 6000
R25 47K
R36 2K
R33 .370
BUFFER-DOUBLER V9 6L6
VOLTAGE REG V14 OD3
VOLTAGE REG V15 OD3
EXCITER RECT V12 5Z3
T5
125
115V
COMM
435V
T4
5V
3A
L45 2.5MH
R2 5K
C5 6000
R3 16K
C2 8000
R-F OSC V8 6V6GT
VOLTAGE REG V13 OD3
NOTES:
1. UNLESS OTHERWISE NOTED:
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

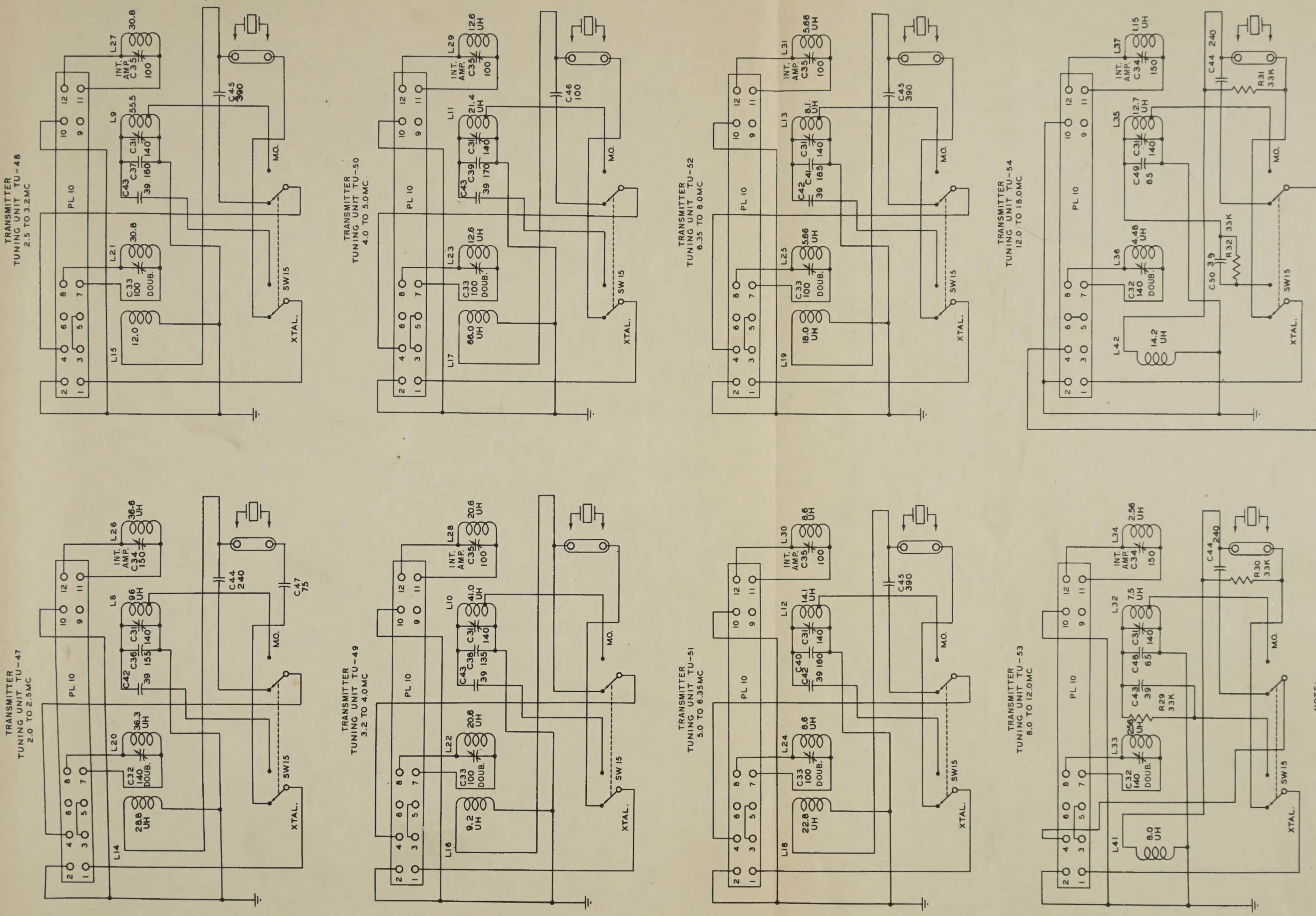
Figure 64. B+, B−, and bias voltage distributions.

TRANSMITTER
TUNING UNIT TU-47
2.0 TO 2.5MC


PL 10
1
2
3
4
5
6
7
8
9
10
11
12
L14
28.8 UH
C32
140
DOUB.
L20
36.3 UH
C42
39
C36
155
C31
140
L8
96 UH
INT.
AMP.
C34
150
L26
36.6 UH

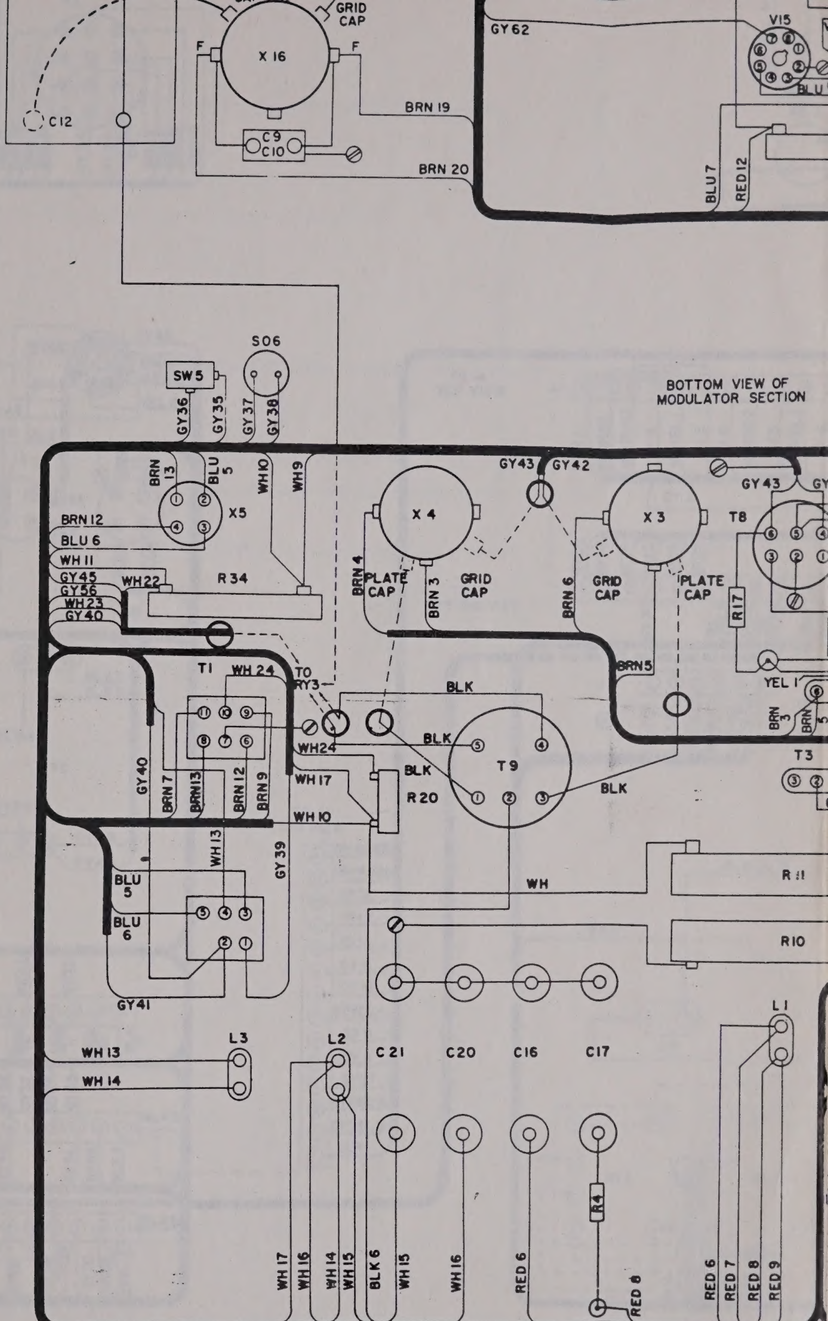
TRANSMITTER
TUNING UNIT TU-48
2.5 TO 3.2MC


PL 10
1
2
3
4
5
6
7
8
9
10
11
12
L15
12.0
C33
100
DOUB.
L21
30.8
C43
39
C37
160
C31
140
L9
55.5
INT.
AMP.
C35
100
L27
30.8


TRANSMITTER TUNING UNIT TU-48 2.5 TO 3.2MC
TRANSMITTER TUNING UNIT TU-50 4.0 TO 5.0MC
TRANSMITTER TUNING UNIT TU-52 6.35 TO 8.0MC
TRANSMITTER TUNING UNIT TU-54 12.0 TO 18.0MC
TRANSMITTER TUNING UNIT TU-47 2.0 TO 2.5MC
TRANSMITTER TUNING UNIT TU-49 3.2 TO 4.0MC
TRANSMITTER TUNING UNIT TU-51 5.0 TO 6.35MC
TRANSMITTER TUNING UNIT TU-53 8.0 TO 12.0MC
PL 10
INT. AMP.
DOUB.
M.O.
SW15
XTAL.
TM826-45

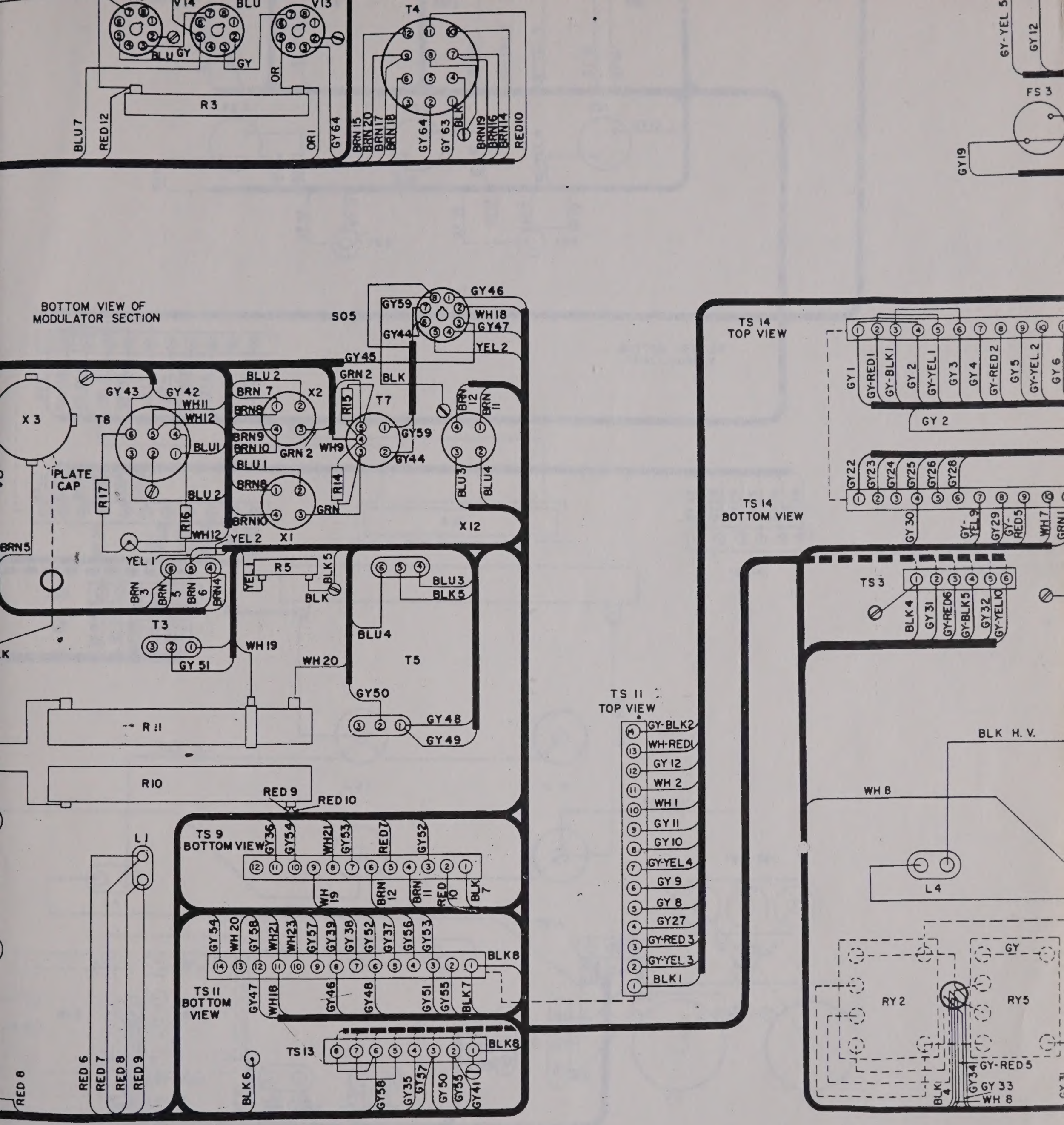
NOTE:
1. UNLESS OTHERWISE NOTED ALL CAPACITORS ARE IN UUF. ALL RESISTORS ARE IN OHMS.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

Figure 65. Schematic diagrams of transmitter tuning units.

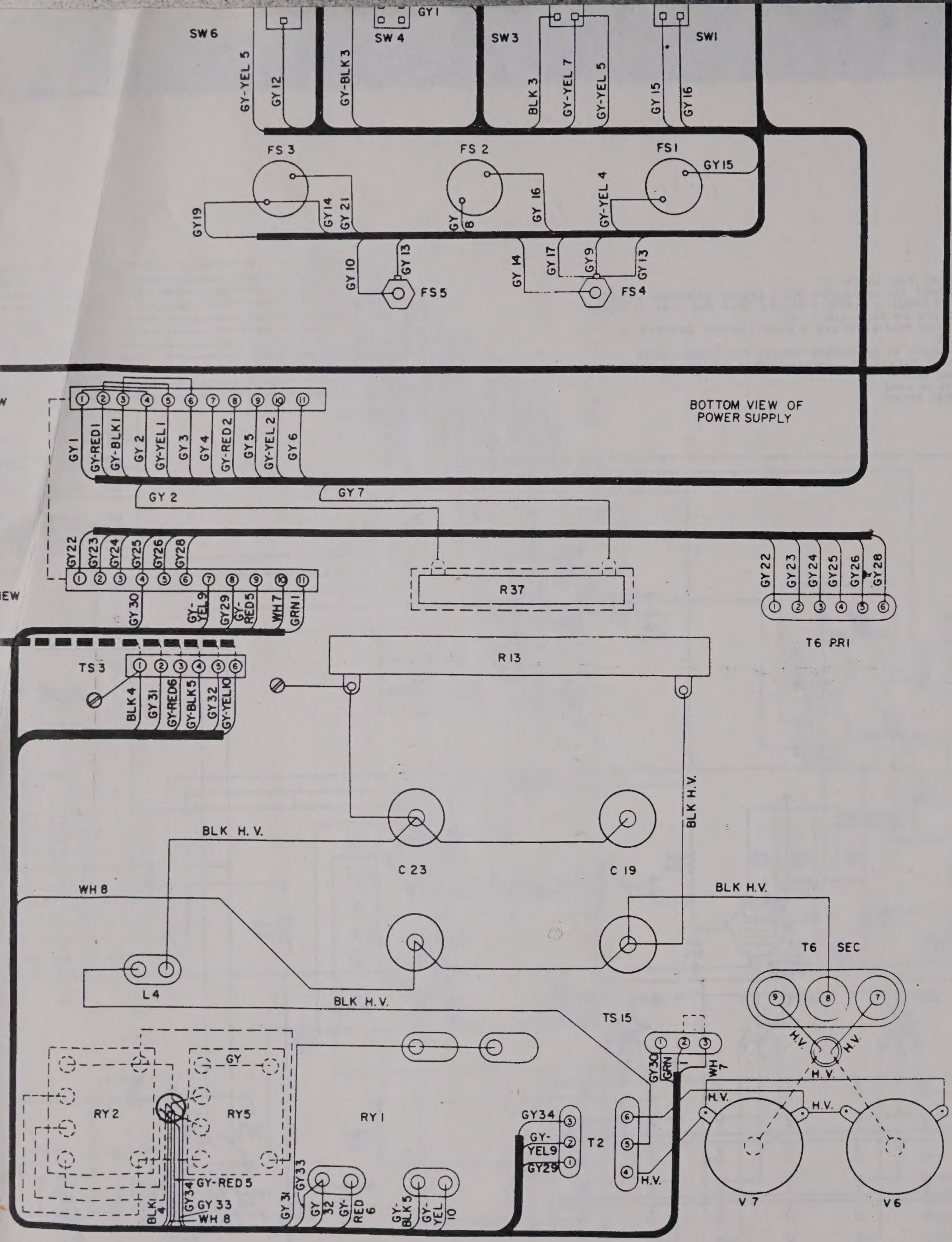

GRID CAP
X 16
F
F
C12
C9
C10
BRN 19
BRN 20
GY 62
V15
BLU
BLU 7
RED 12
S06
SW5
GY36
GY35
GY 37
GY 38
BOTTOM VIEW OF MODULATOR SECTION
BRN 13
BLU 5
WH 10
WH 9
X5
BRN 12
BLU 6
WH 11
GY45
GY56
WH23
GY 40
WH22
R 34
GY43
GY 42
X 4
X 3
T8
GY 43
BRN 4
PLATE CAP
BRN 3
GRID CAP
BRN 6
GRID CAP
PLATE CAP
R17
BRN5
YEL 1
BRN 3
T1
WH 24
TO RY3
BLK
BLK
BLK
BLK
T9
WH24
WH 17
R 20
WH IO
GY 40
BRN 7
BRN13
BRN 12
BRN 9
WH 13
GY 39
T3
BLU 5
BLU 6
GY41
WH
R 11
R10
L1
L3
L2
WH 13
WH 14
C 21
C20
C16
C17
R4
WH 17
WH 16
WH 14
WH 15
BLK 6
WH 15
WH 16
RED 6
RED 8
RED 6
RED 7
RED 8
RED 9

NOTE:
THIS DIAGRAM ALSO APPLIES TO THE H MODELS WITH SERIAL NUMBERS 821 TO 972 ON ORDER NO. 3078-P-51.

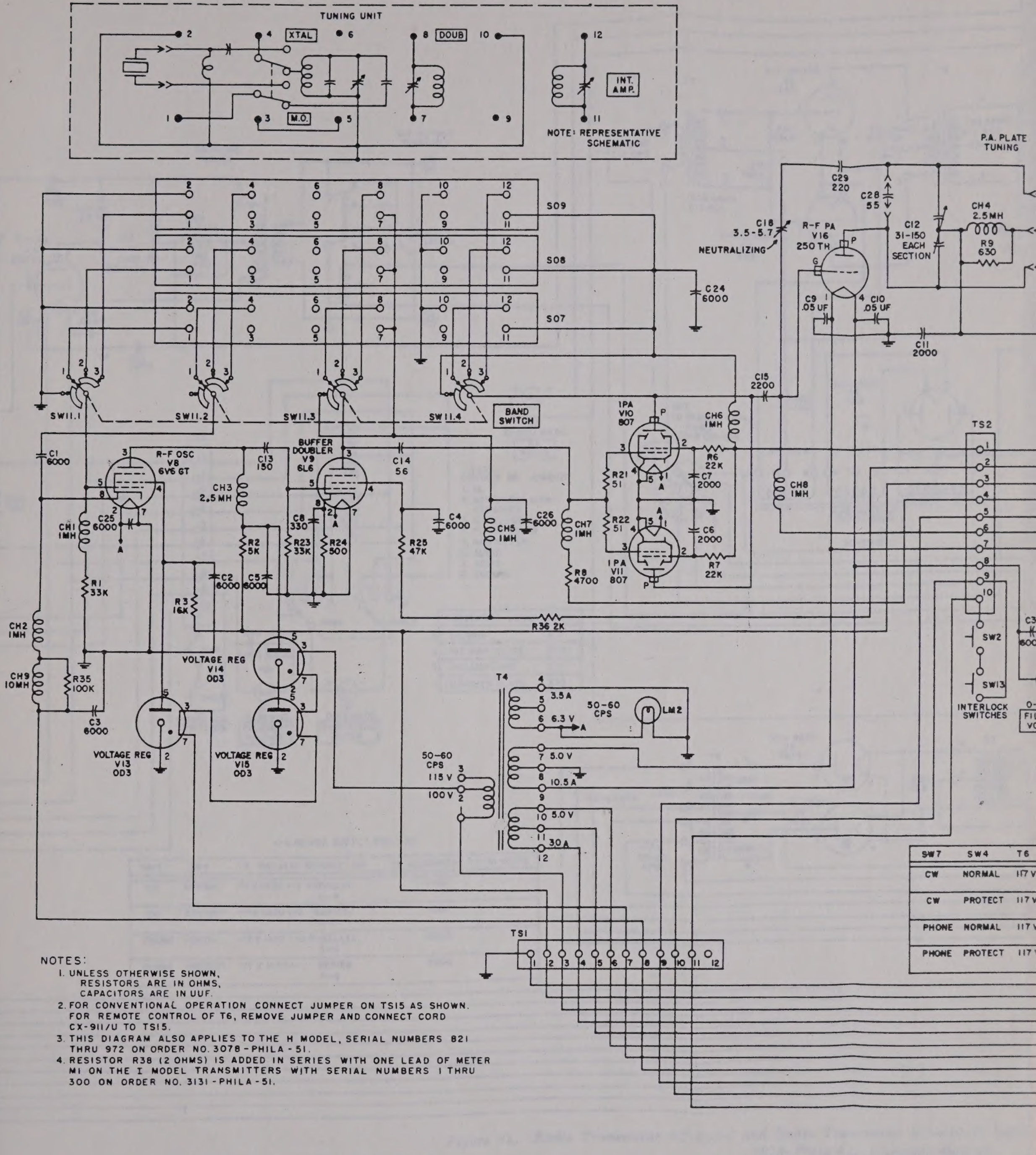
Figure 97. Radio Transmitte


V14
BLU
V13
T4
R3
BLU 7
RED 12
OR 1
GY 64
BRN 15
BRN 20
BRN 17
BRN 18
GY 63
BLK
BRN 19
BRN 16
BRN 14
RED 10
GY-YEL 5
GY 12
FS 3
GY 19
BOTTOM VIEW OF MODULATOR SECTION
SO5
GY 46
GY 59
WH 18
GY 47
GY 44
YEL 2
GY 45
GRN 2
BLK
X3
T8
GY 43
GY 42
WH 11
WH 12
BLU 2
BRN 7
BRN 8
X2
R15
T7
BRN 12
BRN 11
BRN 9
BRN 10
WH 9
GY 59
GY 44
BLU 1
PLATE CAP
R17
R16
BLU 2
BRN 8
R14
BLU 3
BLU 4
BRN 10
GRN
X12
WH 12
YEL 2
X1
BRN 5
YEL 1
R5
BLK 5
BLU 3
BLK 5
BRN 3
BRN 5
BRN 6
BRN 4
T3
WH 19
GY 51
BLU 4
WH 20
T5
GY 50
GY 48
GY 49
R11
R10
RED 9
RED 10
L1
TS 9 BOTTOM VIEW
GY 36
GY 54
WH 21
GY 53
RED 7
GY 52
WH 19
BRN 12
BRN 11
RED 10
BLK 7
GY 54
WH 20
GY 58
WH 21
WH 23
GY 57
GY 39
GY 38
GY 52
GY 37
GY 56
GY 53
BLK 8
TS 11 BOTTOM VIEW
GY 47
WH 18
GY 46
GY 48
GY 51
GY 55
BLK 7
TS 13
BLK 8
RED 6
RED 7
RED 8
RED 9
RED 8
BLK 6
GY 58
GY 35
GY 57
GY 50
GY 55
GY 41
TS 11 TOP VIEW
GY-BLK 2
WH-RED 1
GY 12
WH 2
WH 1
GY 11
GY 10
GY-YEL 4
GY 9
GY 8
GY 27
GY-RED 3
GY-YEL 3
BLK 1
TS 14 TOP VIEW
GY 1
GY-RED 1
GY-BLK 1
GY 2
GY-YEL 1
GY 3
GY 4
GY-RED 2
GY 5
GY-YEL 2
GY 6
GY 2
GY 22
GY 23
GY 24
GY 25
GY 26
GY 28
TS 14 BOTTOM VIEW
GY 30
GY-YEL 9
GY 29
GY-RED 5
WH 7
GRN 1
TS 3
BLK 4
GY 31
GY-RED 6
GY-BLK 5
GY 32
GY-YEL 10
BLK H. V.
WH 8
L4
RY 2
RY 5
GY
GY-RED 5
BLK 4
GY 34
GY 33
WH 8

ure 97. *Radio Transmitters BC–610–I and Radio Transmitter BC–610–H (serial Nos. 821 through 972 on Order No. 3078–Phila–51), practical wiring diagram.*

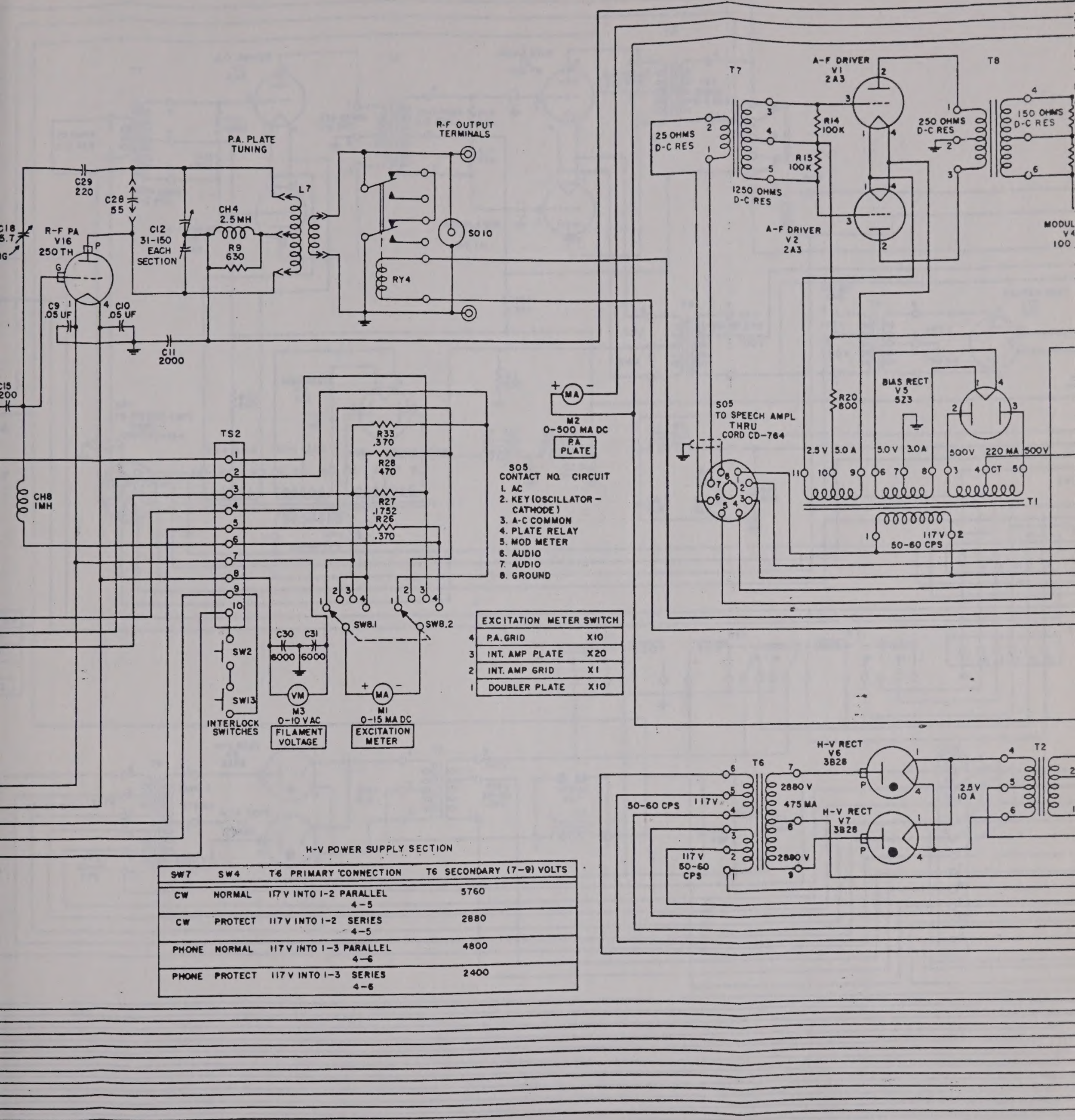

SW6
GY-YEL 5
GY 12
SW 4
GY I
GY-BLK 3
SW3
BLK 3
GY-YEL 7
GY-YEL 5
SWI
GY 15
GY 16
FS 3
FS 2
FSI
GY15
GY19
GY 14
GY 21
GY 8
GY 16
GY-YEL 4
GY 10
GY 13
FS5
GY 14
GY 17
GY9
GY 13
FS4
GY1
GY-RED1
GY-BLK1
GY 2
GY-YEL1
GY 3
GY 4
GY-RED 2
GY 5
GY-YEL 2
GY 6
BOTTOM VIEW OF POWER SUPPLY
GY 2
GY 7
GY22
GY23
GY24
GY25
GY26
GY28
GY 30
GY-YEL 9
GY29
GY-RED5
WH 7
GRN 1
R 37
GY 22
GY 23
GY 24
GY 25
GY 26
GY 28
T6 PRI
R 13
TS 3
BLK 4
GY 31
GY-RED6
GY-BLK5
GY 32
GY-YEL10
BLK H.V.
C 23
C 19
BLK H.V.
WH 8
BLK H.V.
T6 SEC
L4
BLK H.V.
TS 15
GY30
GRN 1
WH 7
H.V.
H.V.
H.V.
H.V.
H.V.
H.V.
H.V.
GY
RY 2
RY5
RY I
GY34
GY-YEL9
GY29
T2
GY-RED 5
GY34
GY 33
WH 8
BLK 4
GY 31
GY 32
GY-RED 6
GY33
GY-BLK5
GY-YEL 10
V 7
V 6

No.


TUNING UNIT
XTAL
DOUB
M.O.
INT. AMP.
NOTE: REPRESENTATIVE SCHEMATIC
S09
S08
S07
SW11.1
SW11.2
SW11.3
SW11.4
BAND SWITCH
C24 6000
C1 6000
R-F OSC V8 6V6 GT
C13 150
BUFFER DOUBLER V9 6L6
C14 56
CH3 2.5MH
CH1 1MH
C25 6000
C8 330
R23 33K
R24 500
R25 47K
C4 6000
CH5 1MH
C26 6000
CH7 1MH
R2 5K
R1 33K
C2 6000
C5 6000
R3 16K
R8 4700
R36 2K
CH2 1MH
CH9 10MH
R35 100K
C3 6000
VOLTAGE REG V14 OD3
VOLTAGE REG V13 OD3
VOLTAGE REG V15 OD3
IPA V10 807
IPA V11 807
R21 51
R22 51
R6 22K
R7 22K
C7 2000
C6 2000
CH6 1MH
CH8 1MH
C15 2200
C18 3.5-5.7
NEUTRALIZING
R-F PA V16 250 TH
C29 220
C28 55
C12 31-150 EACH SECTION
CH4 2.5MH
R9 630
P.A. PLATE TUNING
C9 .05 UF
C10 .05 UF
C11 2000
TS2
SW2
SW13
INTERLOCK SWITCHES
T4
3.5A
6.3 V
50-60 CPS
LM2
5.0 V
10.5 A
5.0 V
30 A
115 V
100 V
TS1
SW7 SW4 T6
CW NORMAL 117 V
CW PROTECT 117 V
PHONE NORMAL 117 V
PHONE PROTECT 117 V

NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. FOR CONVENTIONAL OPERATION CONNECT JUMPER ON TS15 AS SHOWN. FOR REMOTE CONTROL OF T6, REMOVE JUMPER AND CONNECT CORD CX-911/U TO TS15.
3. THIS DIAGRAM ALSO APPLIES TO THE H MODEL, SERIAL NUMBERS 821 THRU 972 ON ORDER NO. 3078-PHILA-51.
4. RESISTOR R38 (2 OHMS) IS ADDED IN SERIES WITH ONE LEAD OF METER M1 ON THE I MODEL TRANSMITTERS WITH SERIAL NUMBERS 1 THRU 300 ON ORDER NO. 3131-PHILA-51.


R-F OUTPUT TERMINALS
P.A. PLATE TUNING
C29 220
C28 55
C12 31-150 EACH SECTION
CH4 2.5MH
R9 630
L7
SO10
RY4
C18 5.7
R-F PA V16 250 TH
P
G
C9 .05 UF
C10 .05 UF
C11 2000
C15 200
CH8 1MH
TS2
1
2
3
4
5
6
7
8
9
10
SW2
SW13
INTERLOCK SWITCHES
R33 .370
R28 470
R27 .1752
R26 .370
C30 6000
C31 6000
SW8.1
SW8.2
VM
M3 0-10 VAC
FILAMENT VOLTAGE
MA
M1 0-15 MA DC
EXCITATION METER
MA
M2 0-500 MA DC
P.A. PLATE
SO5 TO SPEECH AMPL THRU CORD CD-764
T7
25 OHMS D-C RES
1250 OHMS D-C RES
R14 100K
R15 100K
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
T8
250 OHMS D-C RES
150 OHMS D-C RES
MODUL V4 100
R20 800
BIAS RECT V5 5Z3
2.5 V 5.0 A
5.0 V 3.0 A
500V 220 MA 500V
CT
T1
117 V 50-60 CPS
H-V RECT V6 3B28
H-V RECT V7 3B28
T6
2880 V
475 MA
2880 V
50-60 CPS
117V
117 V 50-60 CPS
2.5 V 10 A
T2
H-V POWER SUPPLY SECTION

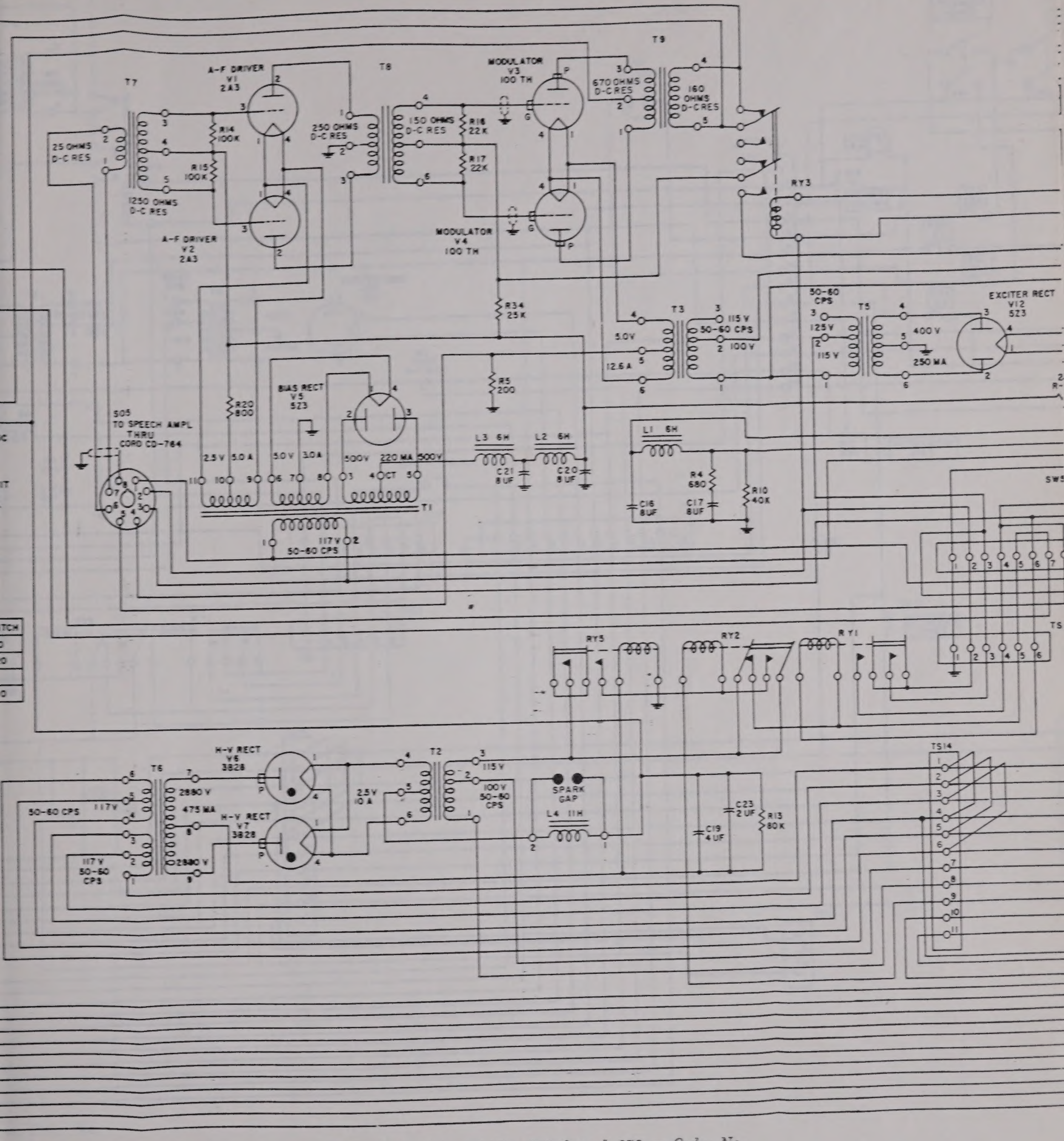
SO5
CONTACT NO. CIRCUIT
1. AC
2. KEY (OSCILLATOR – CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD METER
6. AUDIO
7. AUDIO
8. GROUND

EXCITATION METER SWITCH		
4	P.A. GRID	X10
3	INT. AMP PLATE	X20
2	INT. AMP GRID	X1
1	DOUBLER PLATE	X10

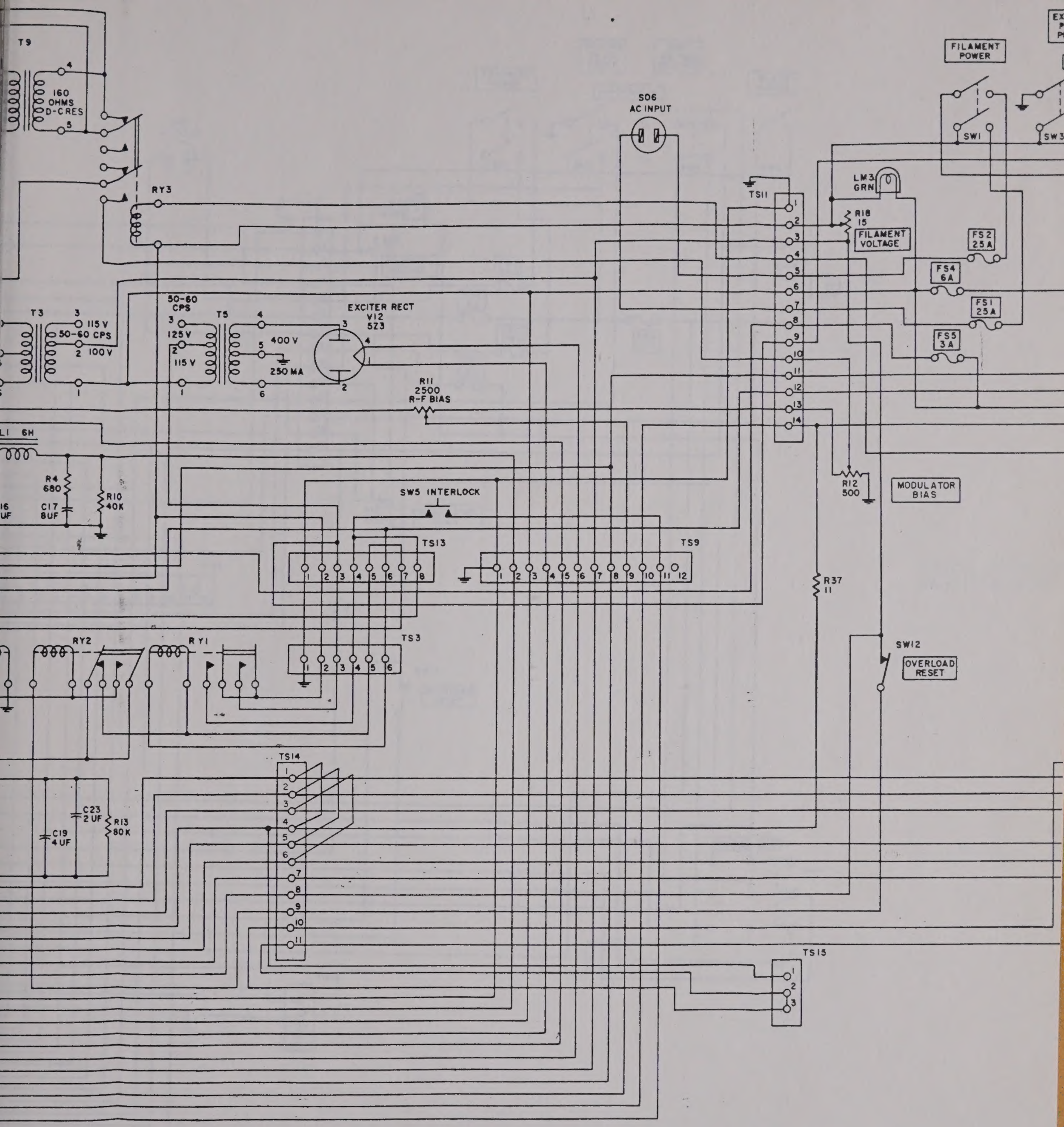
H-V POWER SUPPLY SECTION

SW7	SW4	T6 PRIMARY CONNECTION	T6 SECONDARY (7–9) VOLTS
CW	NORMAL	117 V INTO 1-2 PARALLEL 4-5	5760
CW	PROTECT	117 V INTO 1-2 SERIES 4-5	2880
PHONE	NORMAL	117 V INTO 1-3 PARALLEL 4-6	4800
PHONE	PROTECT	117 V INTO 1-3 SERIES 4-6	2400

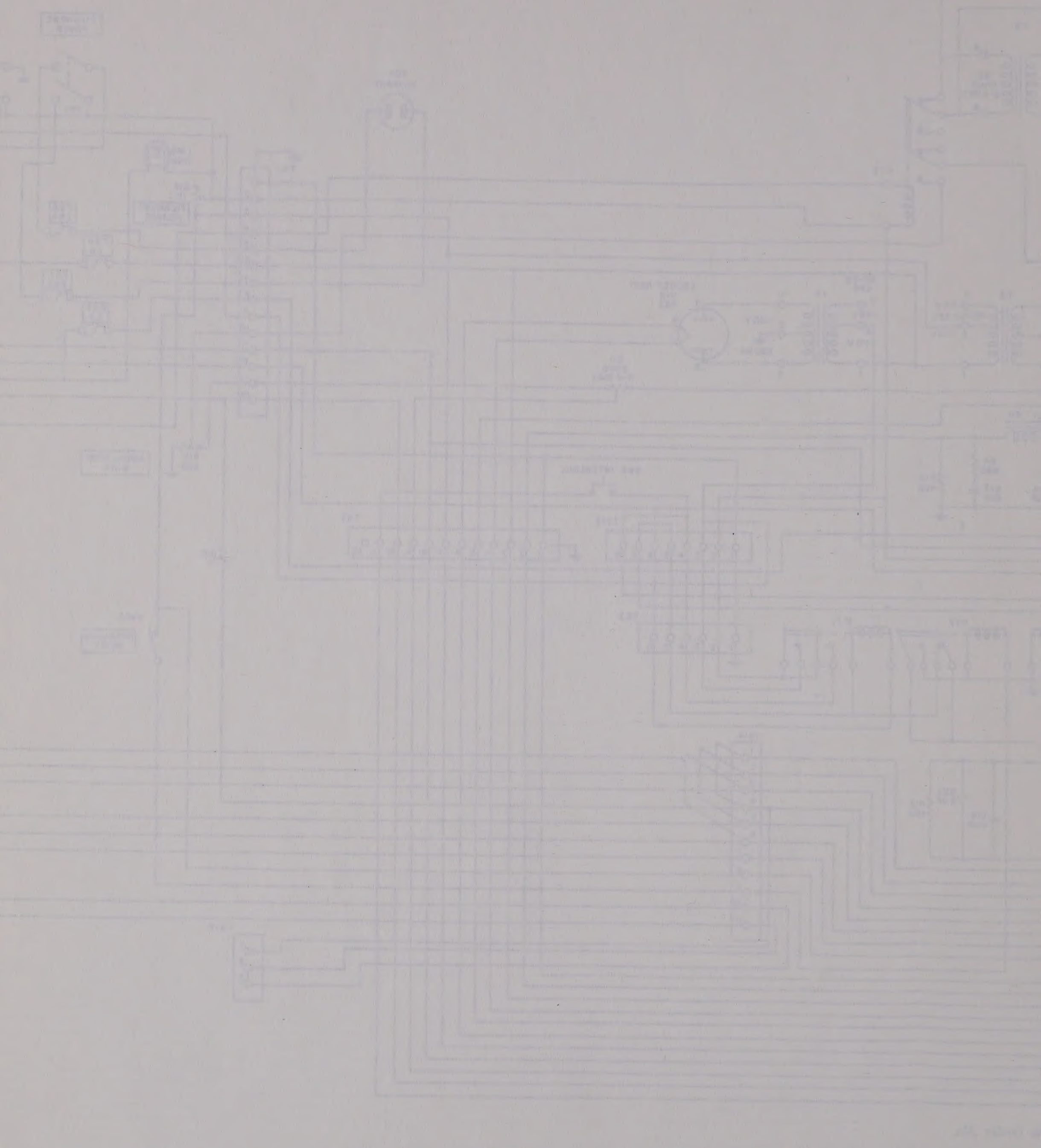
Figure 81. ***Radio Transmitter*** *BC-610-I* ***and*** *Radio Transmitter BC-610-H (seri 3078-Phila-51), schematic diagram.*

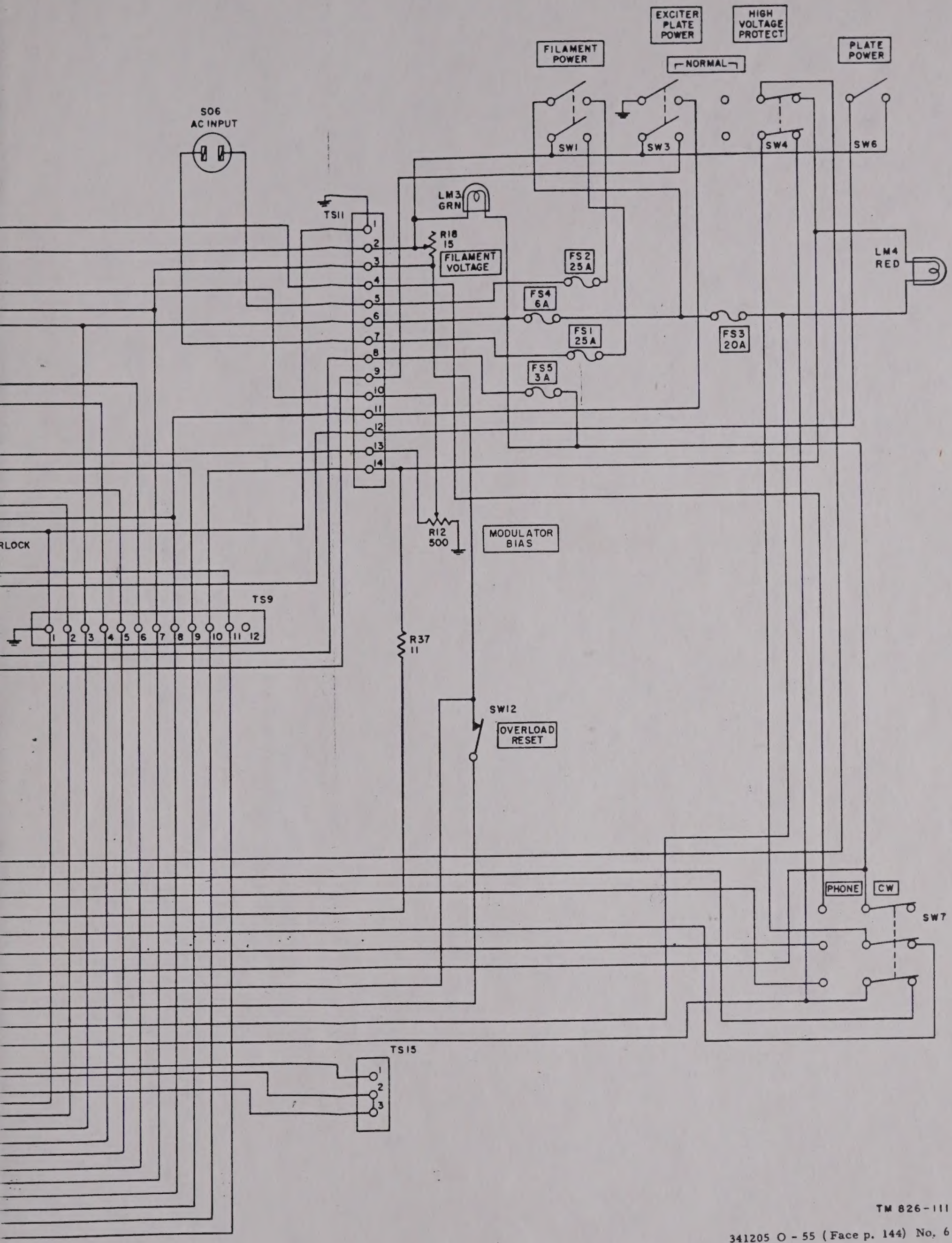

T7
25 OHMS D-C RES
1250 OHMS D-C RES
R14 100K
R15 100K
A-F DRIVER V1 2A3
A-F DRIVER V2 2A3
T8
250 OHMS D-C RES
150 OHMS D-C RES
R16 22K
R17 22K
MODULATOR V3 100 TH
MODULATOR V4 100 TH
T9
670 OHMS D-C RES
160 OHMS D-C RES
RY3
R34 25K
T3
5.0V
12.6 A
115 V 50-60 CPS
100 V
50-60 CPS
T5
125 V
115 V
400 V
250 MA
EXCITER RECT V12 5Z3
R5 200
BIAS RECT V5 5Z3
SO5 TO SPEECH AMPL THRU CORD CD-764
R20 800
2.5 V
5.0 A
5.0 V
3.0 A
500V
220 MA
500V
CT
T1
117 V 50-60 CPS
L3 6H
L2 6H
C21 8 UF
C20 8 UF
L1 6H
R4 680
C16 8UF
C17 8UF
R10 40K
SW5
TS
RY5
RY2
RY1
TS14
T6
50-60 CPS
117V
117 V 50-60 CPS
2880 V
475 MA
2880 V
H-V RECT V6 3B28
H-V RECT V7 3B28
T2
2.5V 10 A
115V
100V 50-60 CPS
SPARK GAP
L4 11H
C19 4 UF
C23 2 UF
R13 80 K

lio Transmitter BC-610-I and Radio Transmitter BC-610-H (serial Nos. 821 through 972 on Order No. 3078-Phila-51), schematic diagram.


T9
4
160 OHMS D-CRES
5
RY3
S06 AC INPUT
FILAMENT POWER
SW1
SW3
LM3 GRN
TS11
R18 15
FILAMENT VOLTAGE
FS2 25 A
FS4 6A
FS1 25 A
FS5 3 A
T3
3
115 V 50-60 CPS
2 100 V
1
50-60 CPS
3
125 V
2
115 V
1
T5
4
5
6
400 V
250 MA
EXCITER RECT V12 5Z3
R11 2500 R-F BIAS
L1 6H
R4 680
R10 40K
C17 8UF
16 UF
R12 500
MODULATOR BIAS
SW5 INTERLOCK
TS13
TS9
R37 11
RY2
RY1
TS3
SW12
OVERLOAD RESET
TS14
C23 2 UF
R13 80K
C19 4 UF
TS15

n Order No.





EXCITER PLATE POWER
HIGH VOLTAGE PROTECT
FILAMENT POWER
NORMAL
PLATE POWER
SW1
SW3
SW4
SW6
SO6
AC INPUT
LM3
GRN
TS11
R18
15
FILAMENT VOLTAGE
FS2
25A
FS4
6A
FS1
25A
FS5
3A
FS3
20A
LM4
RED
1
2
3
4
5
6
7
8
9
10
11
12
13
14
R12
500
MODULATOR BIAS
RLOCK
TS9
R37
11
SW12
OVERLOAD RESET
PHONE
CW
SW7
TS15

TM 826-111

341205 O - 55 (Face p. 144) No. 6